Excel in

O' Level Biology in Just a Day

VOLUME 4

O' LEVEL BIOLOGY SEMINAR

At Buddo Secondary School

ON SATURDAY 08TH JULY 2023

QUESTIONS

Questions

TOPIC 1: DIVERSITY OF LIVING THINGS

1. (a) State the primary function(s) of the following plant organs:
(i) Stems. (02 marks)
(ii) Leaves. (01 marks)
(b) Giving **one** examples in each case, briefly describe how different stems and leaves are modified to perform other functions besides their primary functions stated in (a) above. (12 marks)

2. Cockroaches and butterflies are common insects in nature.
(a) Explain why insects, like cockroaches and butterflies, are the most successful animals on land. (04 marks)
(b) State the economic importance of cockroaches. (03 marks)
(c) Describe the lifecycle of butterflies. (06 marks)
(d) Describe how the lifecycle of cockroaches is different from that of butterflies. (02 marks)

3. You are provided with specimens **R** (Hibiscus flower) and **S** (Sodom apple / *Solanum incanum* flower) which are flowers.
(a) Give **four** reasons why they are flowers. (02 marks)
(b) Giving a reason in each case, state the type of pollination of each specimen. (04 marks)
(c) Give **three** structural differences between specimen **R** and **S**. (03 marks)
(d) Observe specimens **R** and **S**. Describe;
(i) The pistil of specimen **R**. (02 marks)
(ii) The androecium of specimen **S**. (02 marks)
(e) Give two ecological advantages of specimen **R** and **S**. (02 marks)
(f) Remove all the floral parts of specimen R to expose the pistil. Draw and label the exposed pistil. State your magnification. (05 marks)

4. You are provided with specimens **E** (bean pod), **F** (Desmodium), **G** (black jack / Bidens pilosa) and **H** (Tridax), which are fruits.

(a) Giving one reason in each case, identify the type of fruit each specimen is. (04 marks)

(b) Describe how each of the following specimens is adapted for its mode of dispersal (02 marks)

(i) Specimen **G**

(ii) Specimen **H**

(c) Describe how specimen **F** is dispersed (04 marks)

(d) Split specimen **E** longitudinally into two halves. Describe the structure of the specimen. (04 marks)

(e) Draw and label one half of specimen **E**. State your magnification. (06 marks)

5. You are provided with specimens **R** (soldier termite), **S** (housefly), **T** (cockroach) and **U** (honey bee). Observe the specimens with the help of a hand lens where necessary and answer the questions that follow.

a) State the phylum to which the specimens belong. Give two observable features of the specimens to support your answer. (02 marks)

b) Describe the mouthparts of

(i) Specimen **R**. (02 marks)

(ii) Specimen **U**. (02 marks)

c) How is specimen **S** adapted to its mode of life as a vector? (02 marks)

d) Basing on the observable features of the thorax, state three structural differences between specimens **S** and **T**. (03 marks)

e) Using observable characteristic features of the limbs, construct a dichotomous key to identify the specimens **R**, **S**, **T** and **U**. (03 marks)

f) Draw the dorsal view of the head and the first thoracic segment of specimen **T**. State the magnification. (06 marks)

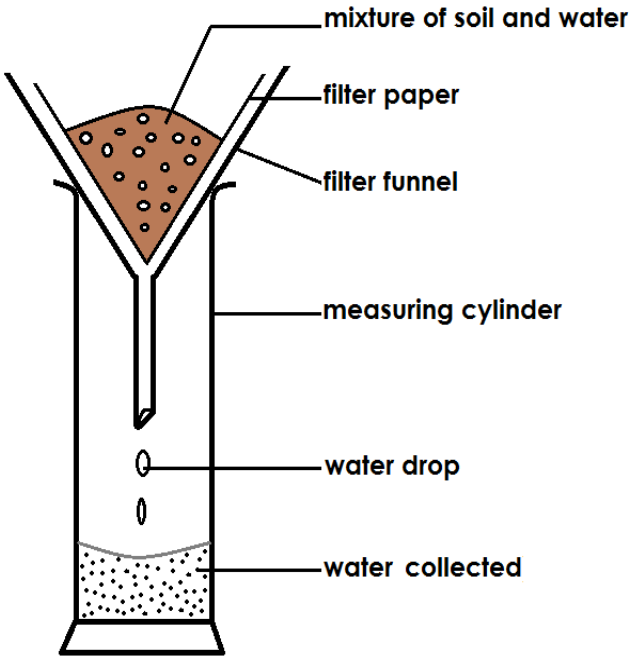
TOPIC 2: SOIL

6. (a) What is a **fertile soil**? (01 marks)

(b) Explain the role of soil organisms in maintaining soil fertility. (06 marks)

(c) Describe an experiment you would carry out to demonstrate the presence of living organisms in a soil sample. (08 marks)

7. The figure below shows the experimental set up, which was used to investigate some properties of two soil samples **J** and **K**. For each soil sample, 40cm^3 of soil was used and 40 cm^3 of water was added to the soil in the funnel. The volume of water collected from each soil sample at different time intervals were recorded as show in the table below.



Time in seconds	Soil sample **J**		Soil sample **K**	
	Volume of water collected in cm^3	Volume of water retained in cm^3	Volume of water collected in cm^3	Volume of water retained in cm^3
10	4		8	
20	7		13	
30	9		18	
40	11		24	
50	12		28	
60	12		32	

(a) Complete the table above by calculating the volume of water retained by each soil sample at different time intervals. (03 marks)

(b) Suggest **two** properties of soil which were being investigated. (02 marks)

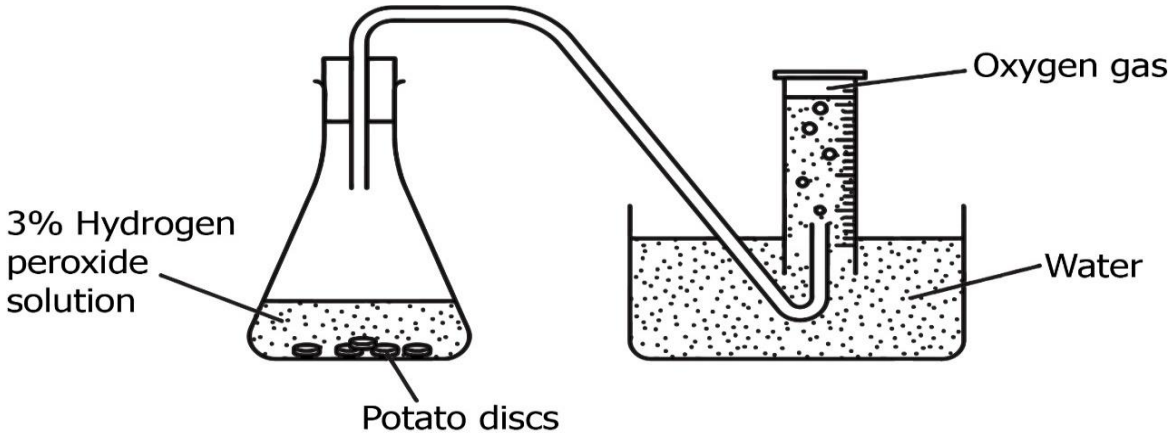
(c) Using the same axes, plot a graph of water retained by soil sample **J** and **K** against time. (06 marks)
(d) From the graph, state the difference in water retained in the two soil samples. (01 mark)
(e) Explain the difference in water retained in the two soil samples stated in (b) above. (03 marks)
(f) Calculate the rate of drainage at 60 seconds for each soil sample. (03 marks)
(g) With a reason, suggest which soil is more suitable for plant growth. (02 marks)

8. (a) What is meant by the term **weathring** as related to soil formation. (01 mark)
(b) Describe how the following agents of weathering can lead to soil formation:
(i) Changes in temperature. (03 marks)
(ii) Plant roots. (04 marks)
(iii) Rain water and carbon dioxide. (04 marks)
(iv) Animals (03 marks)

9. (a) What is **soil profile**? (02 marks)
(b) State **four**:
(i) Constituents of soil. (02 marks)
(ii) Factors that affect the quality of the soil. (02 marks)
(c) State **two** functions of any two constituent of soil stated in (a) above. (04 marks)
(d) Briefly expain how any two factors stated in (a) (ii) affect the quality of the soil. (06 marks)

TOPIC 3: NUTRITION

10. A group of students decided to investigate the effect of increasing the concentration of catalase on the rate of oxygen production. They altered the concentration of the enzyme by using different numbers of 1 mm thick potato discs. They used the apparatus in the diagram below to collect the oxygen produced by different numbers of potato discs in 30 cm^3 of 3% hydrogen peroxide solution.



They recorded how long it took to produce 5 cm^3 of oxygen with each number of discs. Their results are shown in the table below.

Number of potato discs	Time to produce 5 cm^3 of oxygen (seconds)
1	110
2	46
3	32
4	30
5	30

(a) Represent the data in the table on a suitable graph. (06 marks)

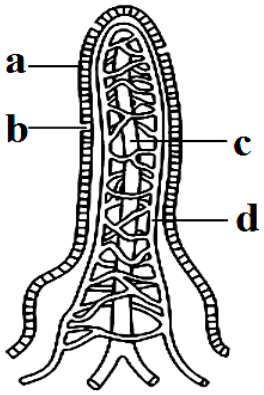
(b) From the graph, explain the effect of increasing enzyme concentration on the rate of the reaction. (04 marks)

(c) State and explain **two** properties of enzymes exhibited by the enzymes in the above experiment. (04 marks)

(d) Besides enzyme concentration, state and explain **two** other factors that will affect the enzyme activity. (04 marks)

(e) Write a word equation to summarize the reaction that was taking place in the experiment. (02 marks)

11. The figure on the right shows a structure found in part of the alimentary canal.

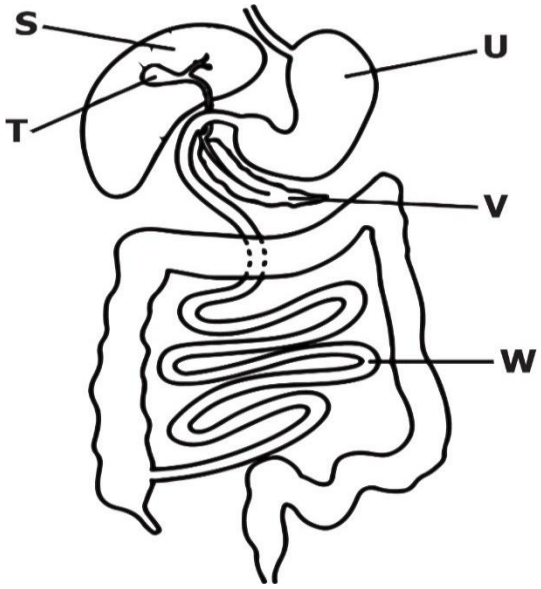


(a) (i) Name the structure shown in figure and state the part of the alimentary canal in which it is found. (02 marks)

(ii) Name the parts labelled **a**, **b**, **c** and **d.** (02 marks)

(b) Explain the ways in which this structure is adapted to enable it to carry out its function. (06 marks)

12. The diagram on the right shows part of the human alimentary canal and associated organs.

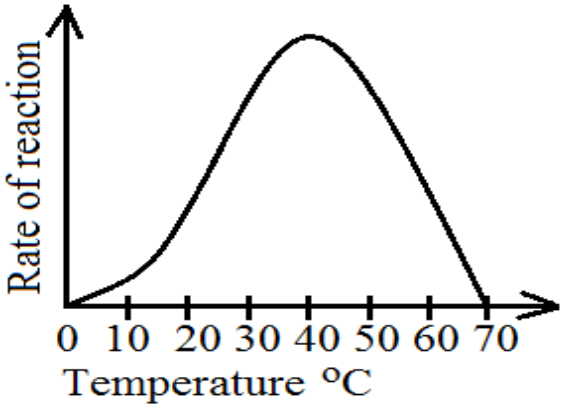


(a) Name the structures labelled **S** to **W**. (02½ marks)

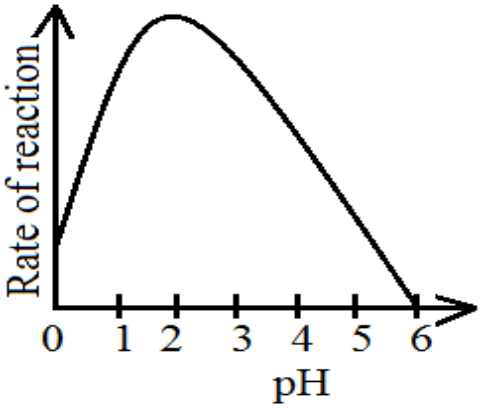
(b) State the digestive roles of structure **S**, **U**, **V** and **W**. (05 ½ marks)

(c) Describe how structure **W** is adapted to its function of absorption. (02 marks)

13. The graphs below show the effects of temperature and pH on the activity of an enzyme in the human digestive system



graph A



graph B

(a) Describe and explain the trend of graph **A**. (06 marks)

(b) Describe and explain the trend of graph **B**. (04 marks)

(c) At what temperature and pH does the enzyme show optimum activity? (02 marks)

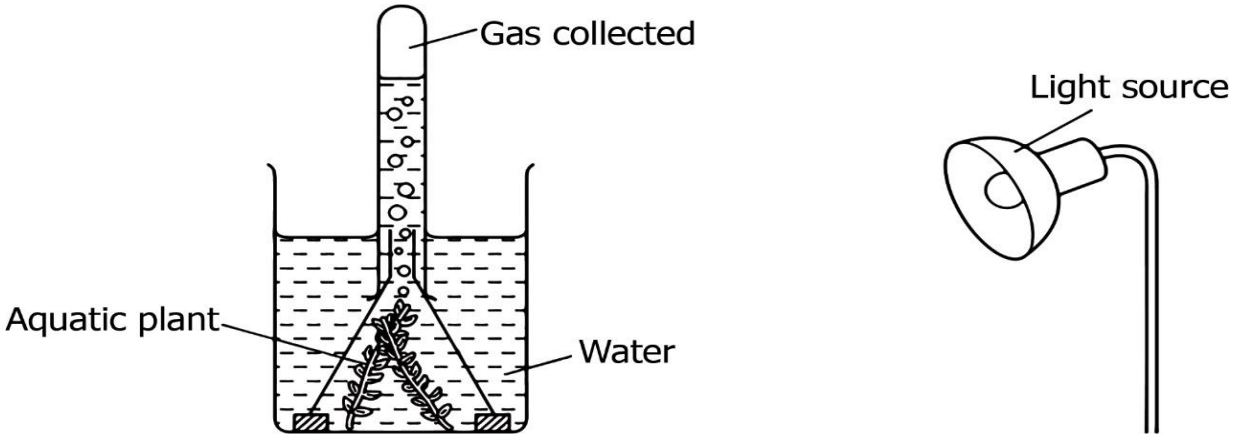
(d) (i). Suggest the identity and location of this enzyme. (02 marks)

(ii). Give a reason for your answer. (01 mark)

(e) For the enzyme stated in (d) (i) above, suggest the food it acts on and the end-products. (01 mark)

(f) Besides temperature and pH state four other factors that affect enzyme activity. (04 marks)

14. The data below shows the number of bubbles produced per minute at 15 ℃ and 37 ℃ from an aquatic plant when it was exposed to light from 100 W electric bulb at several distances from the set up of the plant in water. The experiment is set up as shown below.



The bubbles produced are taken as the rate of photosynthesis. The results of the investigation are shown below.

Distance of the bulb from the plant (cm)	Number of bubbles produced at 15 ℃	Number of bubbles produced at 37 ℃
5	400	810
10	360	750
20	290	630
30	220	500
40	160	390
50	100	310
55	70	270
60	50	200
65	30	175

(a) State the aim of the experiment. (02 marks)

(b) On the same axes, plot a graph of number of bubbles produced at different temperatures against the distance of bulb from the plant. (07 marks)

(c) Describe the shape of the graph at 37℃. (03 marks)

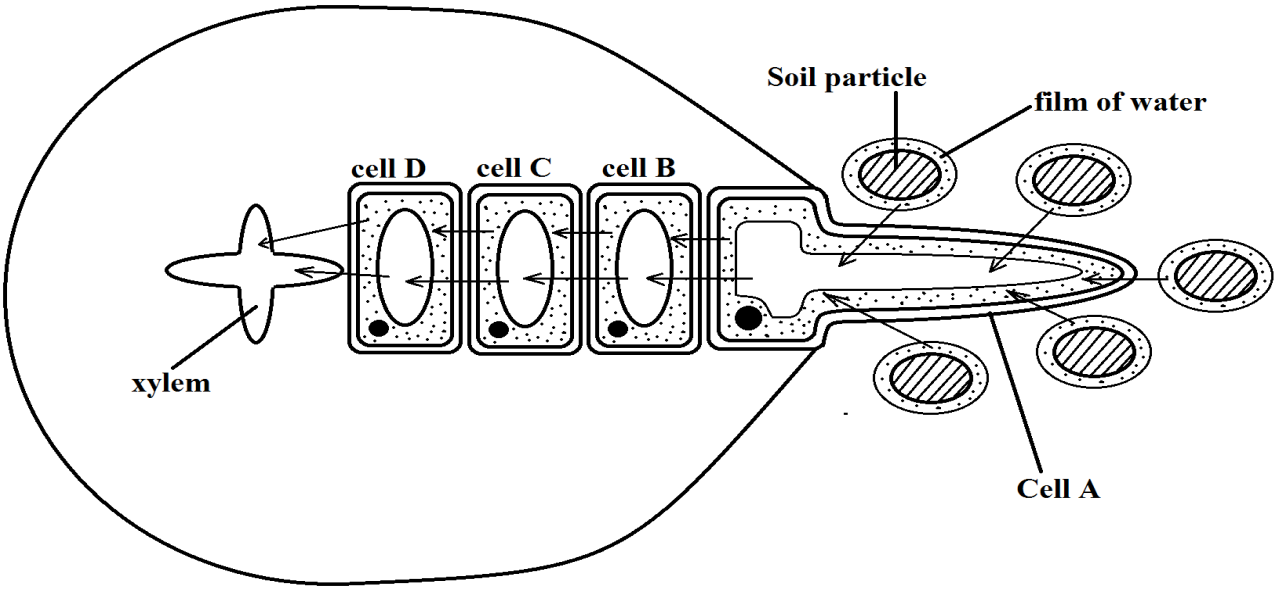
(d) (i) Explain the shape of the graph at 35℃. (03 marks)

(ii) Explain the difference in number of bubbles by the same plant at 15℃ and 35℃ (03 marks)

(e) State **two** importance of photosynthesis. (02 marks)

TOPIC 4: TRANSPORT

15. The figure below shows a section through a plant root. Study it carefully and answer the questions that follow.

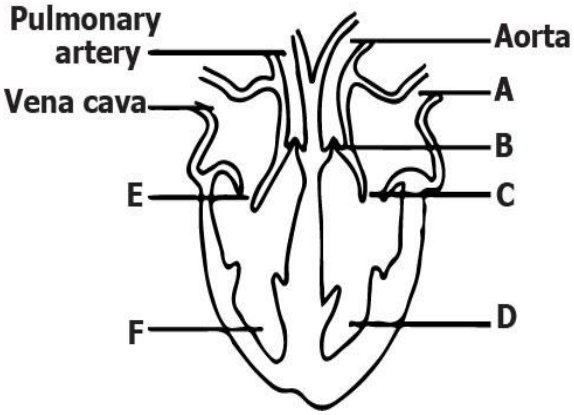


(a) (i). Name the cell labelled **A.** (01 mark)

(ii). Describe how cell **A** is adapted to its functions. (04 marks)

(b) Describe how water around the soil particles is absorbed by cell A until it reaches the xylem (05 marks)

16. The figure below shows a section of the human heart. Study it carefully and answer the questions that follow.



(a) Name the parts labelled **A** to **F** in the figure above. (03 marks)

(b) State the general function of the parts labelled **B**, **C** and **E.** (01 mark)

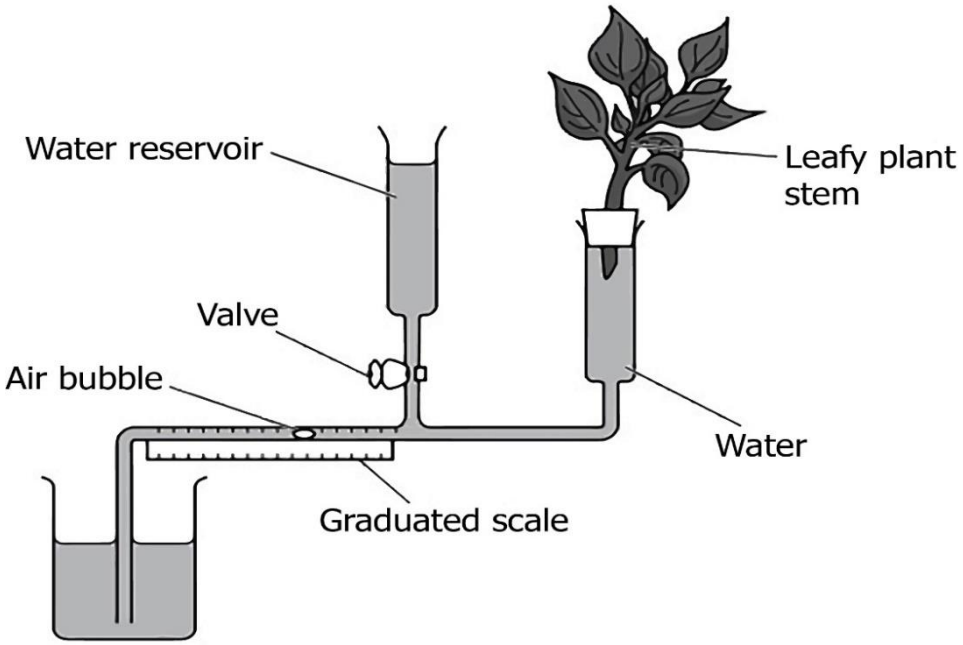
(c) (i). What is **double blood circulation**? (01 mark)

(ii). Describe how double blood circulation occurs in the human heart. (03 marks)

(d) (i). State **one** structural difference between part **D** and part **F.** (01 mark)

(ii). State the significance of the difference stated in (d) (i) above. (01 mark)

17. Transpiration results in water moving through plant stems. This can be measured using the apparatus shown in the diagram.



A student investigated the effect of air movement on the rate of transpiration by placing the setup in a room where there was no movement of air and later introduced a fan near the setup. In each case the setup was left for 5 minutes before taking the readings. The distance moved by air bubble in a known time was recorded and the results are shown in the table below.

Time (minutes)	Position of air bubble (cm)	
	No air movement	Moving air
0	0.0	0.0
1	1.0	1.3
2	2.1	2.5
3	3.1	4.4
4	4.0	5.9
5	5.0	7.6

(a) State the identity of the apparatus. (01 marks)

(b) What assumption is made when this apparatus is used to investigate the rate of transpiration? (01 mark)

(c) Explain each of the following:

(i) Why it is necessary to cut the leafy shoot and fit it into the apparatus under water. (01 mark)

(ii) How the bubble of air is introduced into the capillary tube. (01 mark)

(iii) Why a water reservoir is attached. (01 mark)

(iv) Why the set-up is left for 15 minutes before taking readings. (01 mark)

(d) Represent the data in the table above on a suitable graph. (06 marks)

(e) (i) Compare the effect of still air and moving air on the rate of transpiration. (03 marks)

(ii) Explain the difference in the rate of transpiration in still air and moving air. (03 marks)

(f) The capillary tube has a cross sectional area of 0.8 mm^2. Calculate the rate of movement in mm^3 per minute. (02 marks)

18. Explain:

(a) Why it is important to know recipient blood group before blood transfusion. (04 marks)

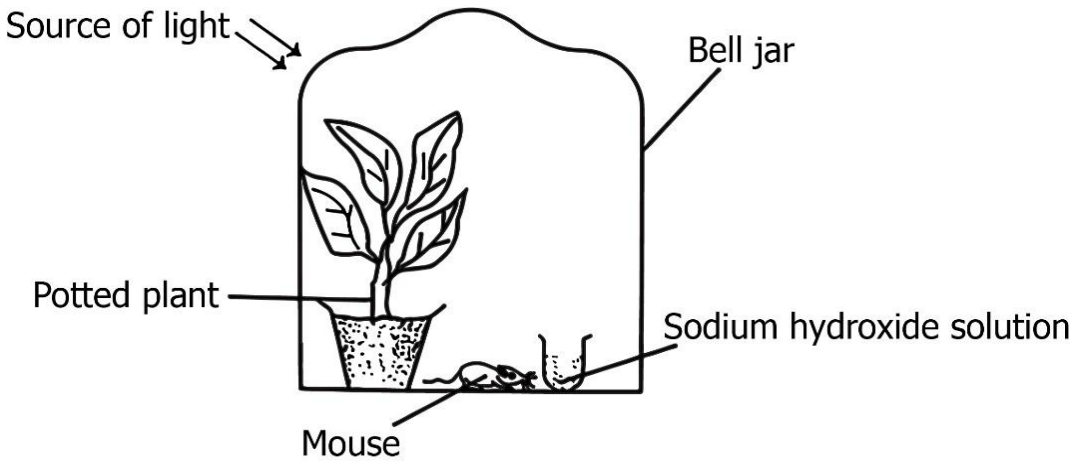
(b) How immunity is weakened by various infections such as HIV. (02 marks)

(c) The functions of the lymph in mammalian body. (05 marks)

(d) The causes and signs and symptoms of elephantiasis. (05 marks)

TOPIC 5: RESPIRATION AND GASEOUS EXCHANGE

19. In an investigation to show that carbon dioxide is released by plants during respiration, students set up the apparatus below in the laboratory and made observations after 72 hours.



(a) Explain how inclusion of the following components would affect the mouse and plant in the experiment:
   (i) Light (02 marks)
   (ii) Sodium hydroxide solution (02 marks)

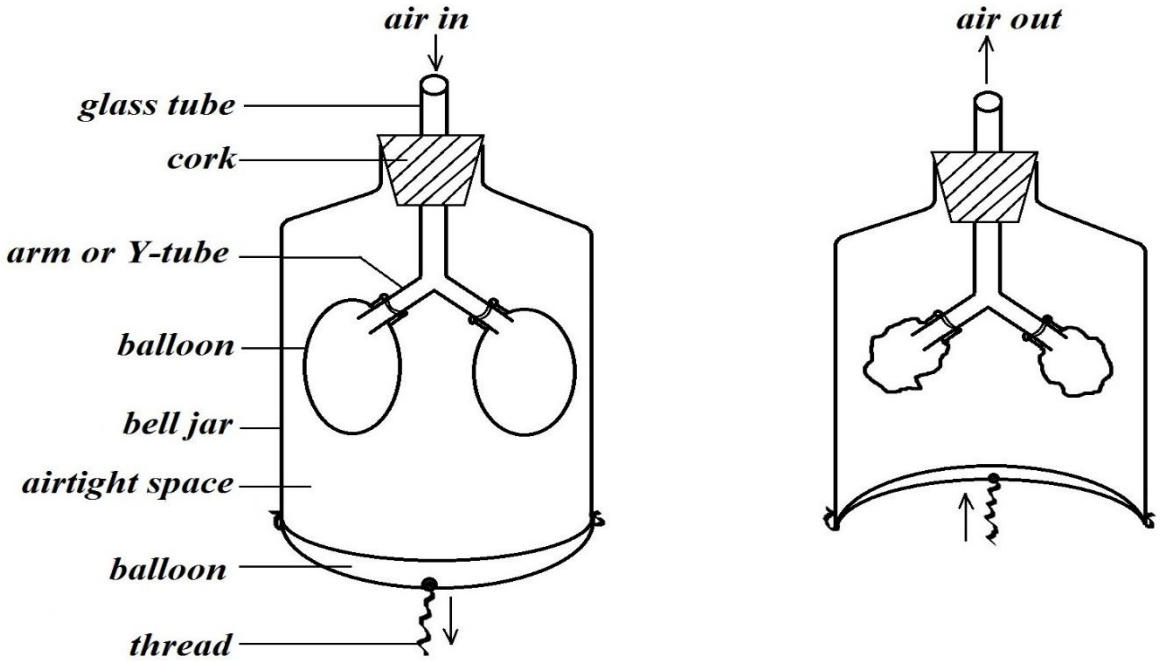
(b) Due to errors made during the set-up, expected results were not realized. Clearly state the adjustments that should be made to obtain correct results. (06 marks)

20. (a) Describe how gaseous exchange occurs in plants. (04 marks)

(b) State the adaptations of the tracheal system for gaseous exchange in insects. (06 marks)

(c) Describe how expiration occurs in insects. (05 marks)

21. The figure below shows a model of the human respiratory system, which was made by one group in senior three.



(a) State the equivalence of the major structures used in the model in the human body. (02 marks)

(b) Explain why pulling downwards the balloon below the model causes the inner balloons to be inflated? (03 marks)

(c) Explain why releasing the balloon below the model causes the inner balloons to be deflated? (03 marks)

(d) Describe how this model does not accurately represent the human respiratory system. (02 marks)

22. Fitness training in athletes reduces the need for anaerobic respiration. It also increases the rate at which lactic acid is removed after exercise. The table shows the concentration of lactic acid in the blood of two different athletes. They exercise for 20 minutes and rest for the next 70 minutes.

Time (minutes)	Lactic acid concentration (mg per 100 cm^3 of blood)	
	Athlete 1	Athlete 2
0	20	20
10	60	86
20	85	98
30	76	99
40	62	95
50	50	81
60	38	68
70	25	62
80	20	50
90	20	39

(a) Represent the data in the table above on a suitable graph. (06 marks)

(b) With a reason in each case, identify the athlete who is physically fit and the one who is unfit. (04 marks)

(c) (i) State the tissue in humans where much lactic acid is released. (01 mark)

(ii) Where does anaerobic respiration occur in a cell. (01 mark)

(d) Describe the shape of the curve for athlete **1**. (02 marks)

(e) Explain the shape of the curve for athlete **1**. (02 marks)

(f) State the importance of ATP in a cell. (04 marks)

23. Explain each of the following biological phenomena:

(a) A rabbit has a higher oxygen demand than a camel. (03arks)

(b) An elephant has a special respiratory surface while as an Amoeba lack a special respiratory surface. (03 marks)

(c) A human being has special respiratory surfaces while as plants lack a special respiratory surface. (04 marks)

TOPIC 6: HOMEOSTASIS, EXCRETION AND OSMOREGULATION

24. Explain each of the following biological phenomena:

(a). Sportsmen release little, concentrated urine at the end of a strenuous exercise (03 marks)

(b). On hot day sweating increases in humans. (02 marks)

(c). When cold hairs are raised and stand upright. (03 marks)

(d). Mammals living in cold areas have a thick layer of subcutaneous fats underneath their skin. (02 marks)

25. (a) What is:

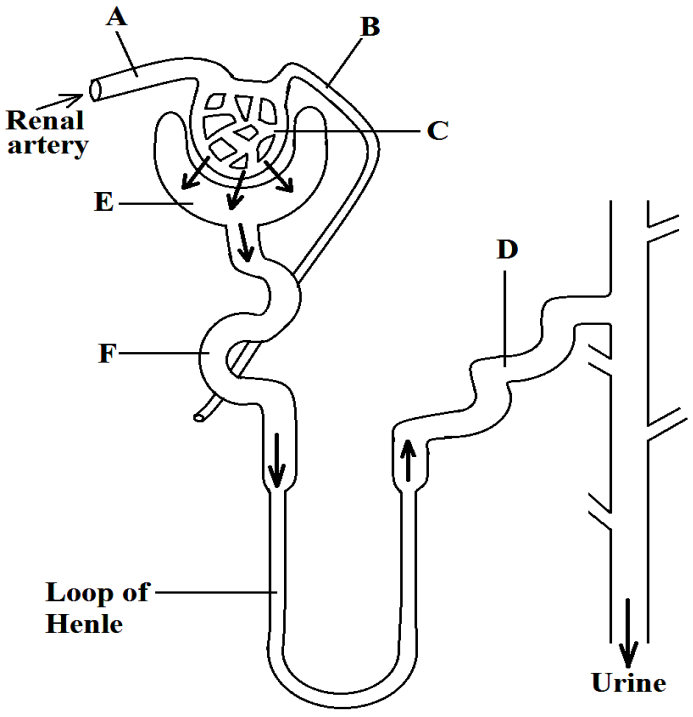
(i) **Homeostasis**. (01 mark)

(ii) **Osmoregulation**. (01 mark)

(b) Explain how the liver regulates blood sugar level in the human body. (06 marks)

(c) Describe the role of the mammalian kidney in osmoregulation. (07 marks)

26. The diagram on the right represents part of a mammalian kidney nephron



(a) Name the parts labelled **A** to **D**. (02 marks)

(b) State the name of the major process which occurs in region **E** and **F.** (02 marks)

(c) Explain how the process in region **E** occurs? (02 marks)

(d) Suggest why some desert mammals have very long loops of Henle? (02 marks)

(e) Explain how part **C** is adapted for its function. (02 marks)

27. A man is cooking in a hot kitchen and sweat is being released by sweat glands in his skin.

(a) Explain why the man's skin released sweat while he was in the hot kitchen. (02 marks)

(b) Sweat contains very small quantities of the waste product urea. State the name of the organ where most urea is made in the body. (01 marks)

(a) The table shows the concentrations of some chemicals found in the sweat, urine, and blood plasma of a healthy human.

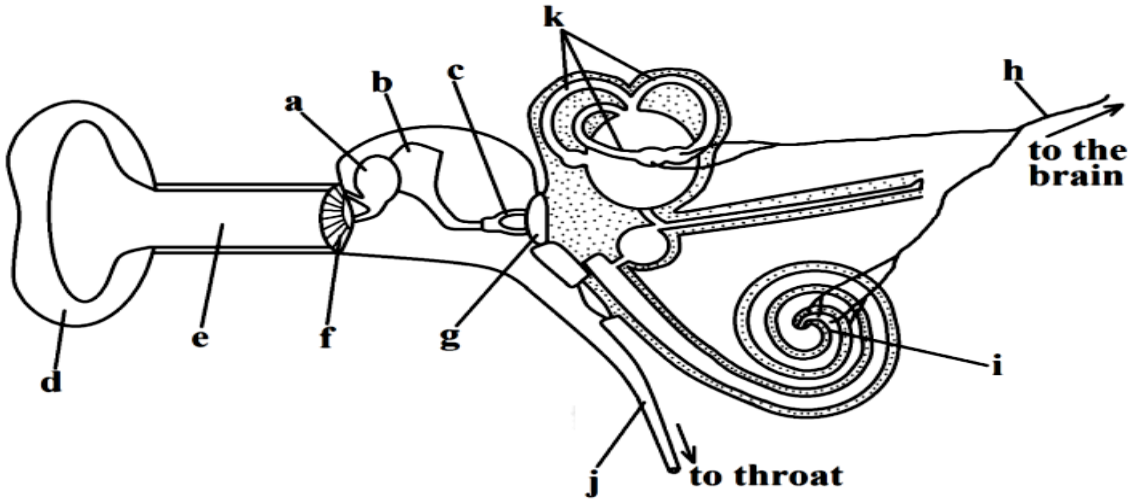
Chemical	Concentration of chemical (mmol per dm^3)		
	Sweat	Urine	Blood plasma
Urea	22	393	6
Sodium	66	110	141
Chloride	59	103	99

(i) Use the data in the table to compare the chemical composition of urine and blood plasma. (04 marks)

(ii) A patient has kidney disease and is about to start dialysis treatment. Suggest and explain the concentration of urea in the sweat of the patient compared to that of a person who does not have kidney disease. (03 marks)

TOPIC 7: COORDINATION IN PLANTS AND ANIMALS

28. The figure below shows the section through the human ear.



(a) Name the parts labelled **d** to **g**. (02 marks)

(b) State general name for structures **a**, **b** and **c**. (01 mark)
(c) State the function of structure **j** and **k**. (02 mark)
(d) Describe how structures labelled **a** to **i** are involved in the hearing process. (04 marks)
(e) State **two** causes of deafness in humans. (01 marks)

29. The effect of auxin concentration on growth response of two parts of a plant, **X** and **Y** was investigated over time. The results were tabulated as shown in the table below.

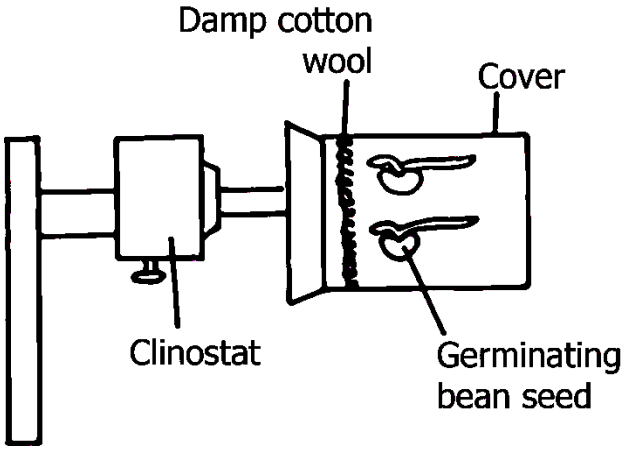
Concentration of auxins (parts per million)	Percentage of growth inhibition/stimulation on part **X**	Percentage of growth inhibition/stimulation on part **Y**
10^{-6}	0	0
10^{-5}	40	0
10^{-4}	55	0
10^{-3}	40	25
10^{-2}	0	65
10^{-1}	-45	155
1	-90	210
10^{1}	0	125
10^{2}	0	-90

(a) On the same axes, draw line graphs of the effect auxins on the growth of the two plant parts, **X** and **Y** (percentage inhibition or stimulation) against the concentration. (07 marks)
(b) With reasons, name the two parts of the plant, **X** and **Y**. (02 marks)
(c) From the graph identify:
  (i) the point at which the percentage stimulation was the same for both **X** and **Y**. (01 mark)
  (ii) the optimum concentration of auxins required for part **Y** (01 mark)
(d) Explain the differences in the growth of part **X** and **Y**. (04 marks)

(d) State **three** ways in which the effects of auxins on plants are applied in farming. (03 marks)

(e) Explain how auxins are utilized as selective weed killers in agriculture. (02 marks)

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



(a) (i) Name the type of response that was being investigated. (01 mark)

(ii). State the importance of the response stated in (a) (i) to the plant. (02 marks)

(b) If the clinostat was not rotating:

(i) State the observations that would be made on the seedlings after three days. (2 marks)

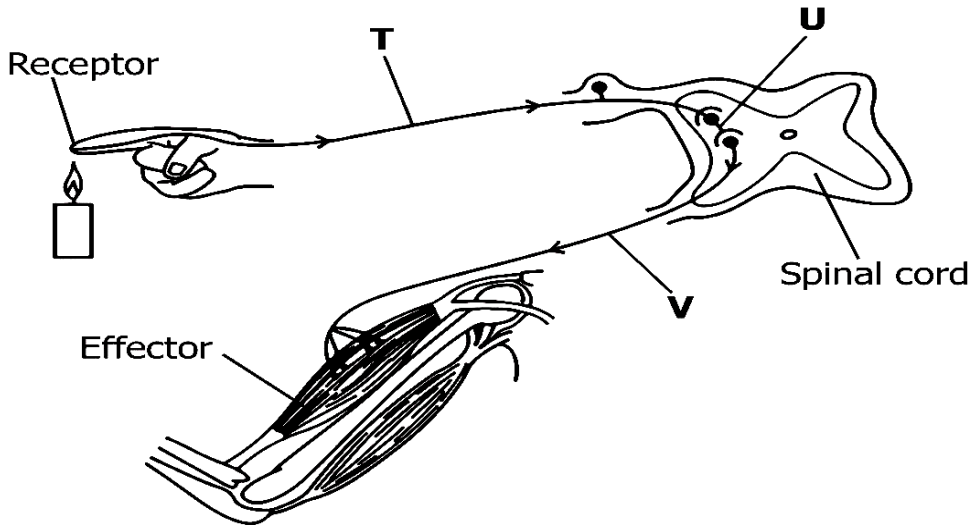
(ii) Explain the observations in (b) (i) above. (3 marks)

(c) If the experiment was repeated with the clinostat rotating:

(i) State the observation that was made on the seedlings after three days. (1 mark)

(ii) Give a reason for the observation made on the seedlings. (1 mark)

31. A person accidentally touches a burning candle and responds as illustrated in the diagram below.



(a) With a reason, state the:
(i) Type of nervous response being illustrated. (01 mark)
(ii) Name of the nerve cells labelled **T**, **U** and **V**. (03 marks)
(b) Explain how the response illustrated above occurs. (06 marks)

32. (a) Giving **two** examples in each case, state the different types of tactic responses. (06 marks)
(b) State the importance of tactic responses to living organisms. (04 marks)
(c) Describe an experiment to show that earthworms are negatively phototactic. (05 marks)

TOPIC 8: LOCOMOTION IN ANIMALS

33. (a). Distinguish between
i. Movement and locomotion (01 marks)
ii. Endoskeleton and exoskeleton (01 marks)
(b) why do animals locomote? (03 marks)
(c) Describe how birds are adapted for flight. (05 marks)
(d). Describe how flapping flight occurs in birds (05 marks)

34. (a) What is a **joint**? (01 mark)
(b) State the functions of joints in animals. (05 marks)
(c) State **two** types of synovial joints. (01 mark)
(d) State the functions of the different parts of a synovial joint. (08 mks)

35. You are provided with specimens **V** (cervical vertebra) and **W** (Thoracic vertebra) both obtained from the same animal.
(a) Basing on observable structural characteristics, identify the specimens. (04 marks)
(b) Giving a reason in each case, suggest the part of the body of the animal from which each specimen was obtained. (04 marks)
(c) Describe how specimen **V** is adapted for its functions. (04 marks)
(d) (i) Measure and record the length of the neural spine of

specimen **W**. (01 mark)

(ii) Relate the length obtained in (d) (i) above to the function of specimen **W**. (01 mark)

(f) Draw and label the posterior view of specimen **V**. State your magnification. (06 marks)

TOPIC 9: GROWTH AND DEVELOPMENT

36. (a) Distinguish between growth and development. (01 mark)

(b) Describe the events that occur during germination of a named dicot seed. (06 marks)

(c) (i) State the conditions necessary for seed germination. (02 marks)

(ii) Describe an experiment to show that oxygen is necessary for germination. (06 marks)

37. (a) What is **seed dormancy**? (01 mark)

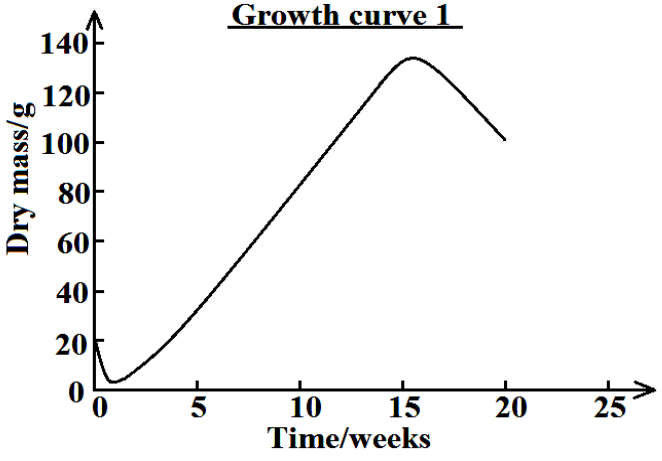
(b) State the importance of seed dormancy. (03 marks)

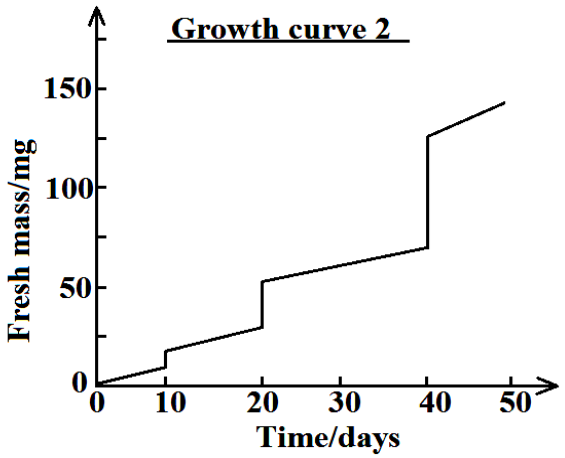
(c) State the disadvantages of seed dormancy. (02 marks)

(d) State the causes of seed dormancy. (04 marks)

(e) Exaplain how seed dormancy can be broken. (05 marks)

38. The graphs below show the growth curves for two different organisms: an arthropod and annual plant (e.g. pea plant).





a) Which growth curve represents:

i. Arthropods (½ mark)

ii. Annual plant (½ mark)

b) From the graphs above, which growth parameter is most accurate to estimate growth rate of an organism? Give a reason for your answer. State the disadvantage of this method. (03 marks)

c) In **curve 2**:

i. Which process is taking place at 20 and 40 days? (01 mark)

ii. Which growth phase is between 20 and 40 days? (01 mark)

d) Describe and explain the growth pattern in **curve 1**. (08 marks)

e) State the differences between:

i. Growth in **curve 1** and growth in **curve 2**. (02 marks)

ii. Growth in annual plants and in perennial plants. (02 marks)

f) State internal factors that affect growth in plants and animals. (02marks)

TOPIC 10: REPRODUCTION IN PLANTS AND ANIMALS

39. (a) What is **asexual reproduction**? (01 mark)

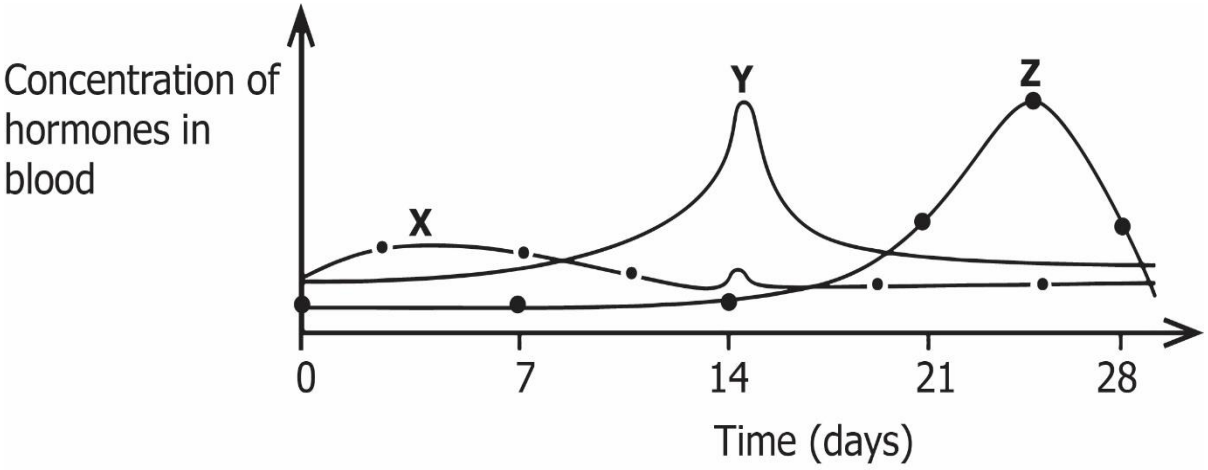
(b) Describe how asexual reproduction occurs in the following organisms:

(i) Amoeba. (05 marks)

(ii) Yeast. (04 marks)

(iii) Rhizopus. (05 marks)

40. The graph shows the concentration in the blood of three of the four hormones FSH, LH, oestrogen and progesterone during a menstrual cycle.

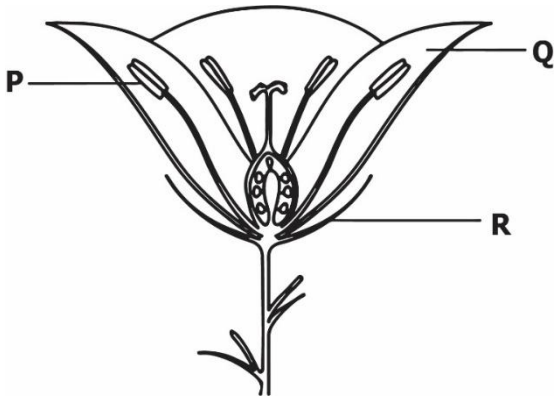


(a) With reason(s), state the identity of hormones **X**, **Y** and **Z**. (03 marks)

(b) State the identity of the missing hormone. On the graph above, sketch the curve for missing hormone and label it. (02 marks)

(c) Explain the variation of the concentration of each hormone (**X**, **Y** and **Z**) with time during the menstrual cycle. (15 marks)

41. The diagram below shows a section of an insect-pollinated flower.



(a) Name the structures labelled **P**, **Q** and **R** and one function of each structure. (03 marks)

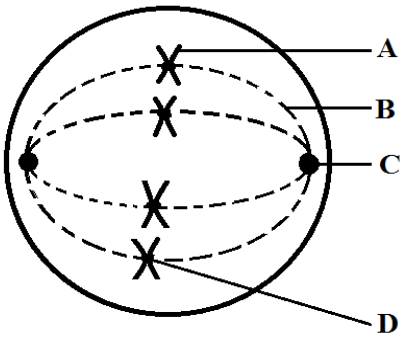
(b) With a reason, state the type of pollination that can occur in this flower. (02 marks)

(c) Describe how this flower is adapted to its mode of pollination. (03 marks)

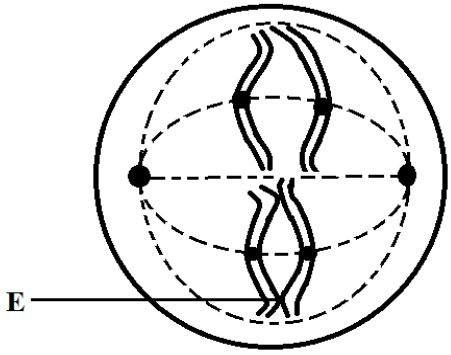
(d) Describe how fertilisation occurs in this flower. (07 marks)

TOPIC 11: GENETICS AND EVOLUTION

42. The diagrams below show two cells from the same animal in the process of cell division.



Cell 1



Cell 2

(a) Name the structures labelled **A** to **D**. (02 marks)

(b) (i). State the type and phase of cell division occurring in **cell 1**. (02 marks)

(ii). State the type and phase of cell division occurring in **cell 2** (02 marks)

(c) What is the significance of structure **E**? (01 marks)

(d) State three differences between cell division in **cell 1** and the cell division in **cell 2** (03 marks)

43. (a) What is meant by the following terms:

(i) Genetics. (01 mark)

(ii) Dominance. (01 mark)

(iii) Recessive. (01 mark)

(iv) Heterozygous. (01 mark)

(v) Homozygous. (01 mark)

(b) In a genetic cross between a pure breeding plant that produces blue flowers and a pure breeding plant that produces white flowers, the $\mathbf{F_1}$ generation produced only blue flowers.

(i) Draw a genetic diagram to show the nature of the offspring of $\mathbf{F_1}$. (05 marks)

(ii) By means of labelled cross diagram, state the phenotype of flowers expected if the $\mathbf{F_1}$ generation is cross-pollinated with a pure breeding plant that produces white flowers. (05 marks)

44. (a) Define the following terms:

(i) Mutation. (01 mark)

(ii) Evolution. (01 mark)

(iii) Natural selection. (01 mark)

(b) State:

(i) types of mutation. (02 marks)

(ii) causes of mutation. (03 marks)

(c) (i) State the different types of evidences for evolution. (04 marks)

(ii) Explain one type of the evidences for evolution stated in (c) (i) above. (03 marks)

45. A cross between red and white flowered snapdragon plants produces $\mathbf{F_1}$ with Pink flowered plants.

(a) Explain the absence of white and red flowered plants in the $\mathbf{F_1}$. Show your working. (09 marks)

(b) Calculate the genotypic and phenotypic ratios of a cross between **F_1** plant and white flowered plant. (06 marks)

46. (a) What is meant by **sex-linked traits**? (01 mark)

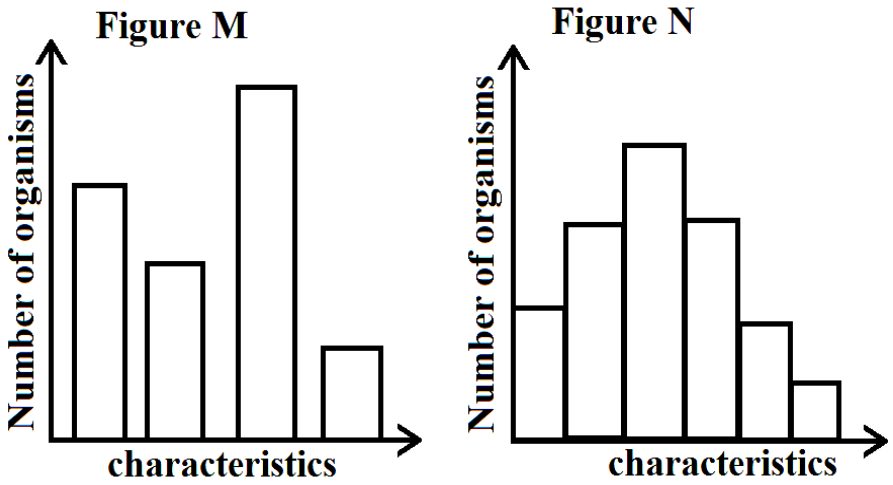
(b) Haemophilia is a recessive sex-linked trait. Using suitable symbols carry out a genetic cross to determine the genotypes and phenotypes of the offspring when a haemophilic man married a carrier woman for haemophilia. (06 marks)

i. State the genotypic ratio and phenotypic ratio of the offspring? (01 mark)

ii. Calculate the probability of producing a haemophilic girl. (01 mark)

iii. Calculate the percentage of producing a normal boy. (01 mark)

47. The figures below represent the variations in different characteristics.



(a) (i). What is **variation**? (01 marks)

(ii). What type of variation is represented by each figure? (02 mark)

(b) How do the two types of variation you named in (a) above differ? (04 marks)

(c) (i). For each type of variation, state two examples of characteristics. (04 marks)

(ii). Name three sources of variation in sexually reproducing organisms. (03 mark)

(d) Blood group system ABO is an example of multiple alleles. Using relevant genetic symbols carry out a genetic cross to determine

the genotypes and phenotypes of the offspring when man of blood group B heterozygous married a woman of blood group A homozygous. (06 marks)

TOPIC 12: INTER-RELATIONSHIPS (ECOLOGY)

48. (a) What is meant by the term **population**? (01 mark)

(b) Explain why the population of humans increases exponentially irrespective of continued natural calamities? (05 marks)

(c) State the:

(i) factors that affect population growth. (06 marks)

(ii) methods of controlling microbial growth. (03 marks)

49. The kapok tree is a flowering plant that grows rapidly to become one of the tallest trees in a tropical rainforest ecosystem. Kapok tree provides a habitat for insect-eating birds and frogs. Bats feed on the nectar from its flowers. Insects feed on its leaves. The fallen leaves and the dead animals in the ecosystem are decomposed by soil bacteria and fungi.

Use the information provided to draw:

(a) A food chain containing at least three organisms in the ecosystem. (01½ marks)

(b) A food web containing all the organism in the ecosystem. (03½ marks)

(c) A pyramid of number and a pyramid of biomass for the food chain drawn in (a) (i) above. (03 marks)

(d) Explain the different shapes of the two pyramids. (02 marks)

*****ꕥ END ꕥ*****

We wish success in your examinations. God bless you.