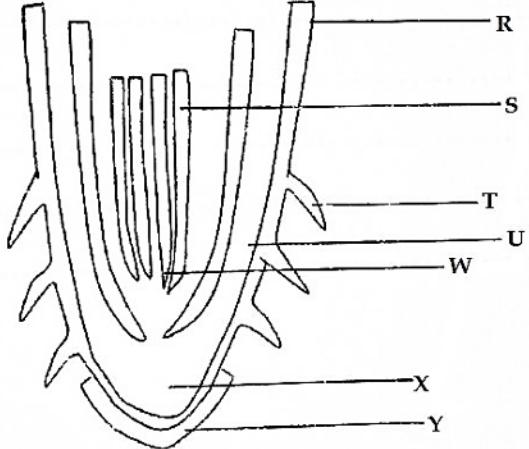


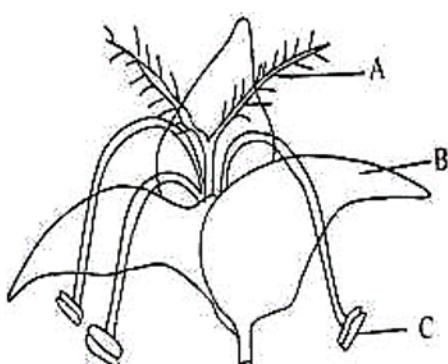
QUESTIONS FOR THE 'O' LEVEL BIOLOGY SEMINAR HELD AT JIPRA ON 25TH JUNE, 2023.

TOPIC 1: DIVERSITY OF LIVING THINGS

1. (a) Describe the **life cycle** of a housefly. (08marks)
(b) What is the economic importance of houseflies? (04marks)
(c) How would you **minimize the spread** of diseases transmitted by houseflies in a home? (03marks)
2. The figure below shows a longitudinal section through part of a plant showing its internal structures. Study it carefully and answer the questions that follow.


 - (a) (i) Name the parts labelled R – Y (03½ marks)
(ii) With a reason, name the part from which the figure was obtained. (1½ mark)
 - (b) State the **functions** of parts labelled S, T and W (03 marks)
 - (c) How is part T **adapted** to perform its function? (03 marks)

3. Study the diagram of flower of a plant and answer the questions that follow.

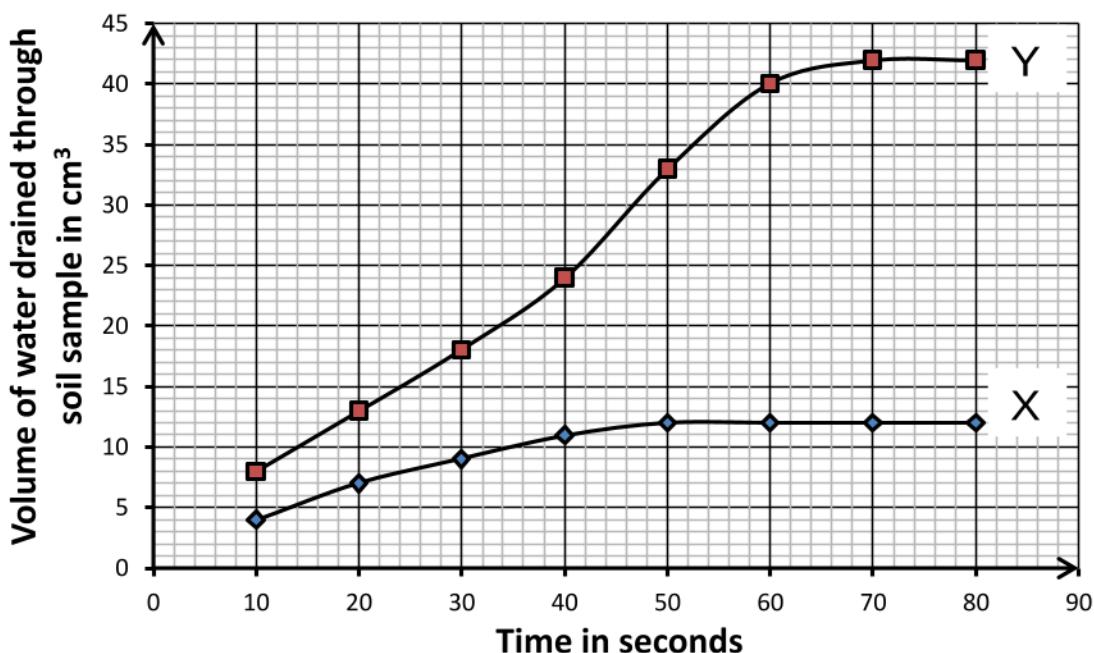


- (a) Name the parts labelled A, B, and C. (1½ marks)
- (b) Suggest the agent of pollination for the flower. (0½ mark)
- (c) State the adaptations of the flower for the agent of pollination mentioned in (b) above. (04 marks)
- (d) State the conditions that promote cross pollination in flowers. (02 marks)

4. (a) **Explain** the importance of fruit / seed dispersal. (05 marks)
(b) Describe how fruits/seeds are **adapted** to dispersal by;
(i) wind (04 marks) (ii) animals. (06 marks)

TOPIC 2: SOIL

5. (a) **What is meant** by soil degradation? (02 marks)
(b) **Explain** how human activities degrade soil. (07 marks)
(c) **How can** soil pollution be controlled? (06 marks)
6. (a) An experiment was carried out to determine the volume of water that was drained through each of soil sample **X** and **Y** at different time intervals. The results obtained are shown in the graph below. Study the graph carefully and answer the questions that follow.



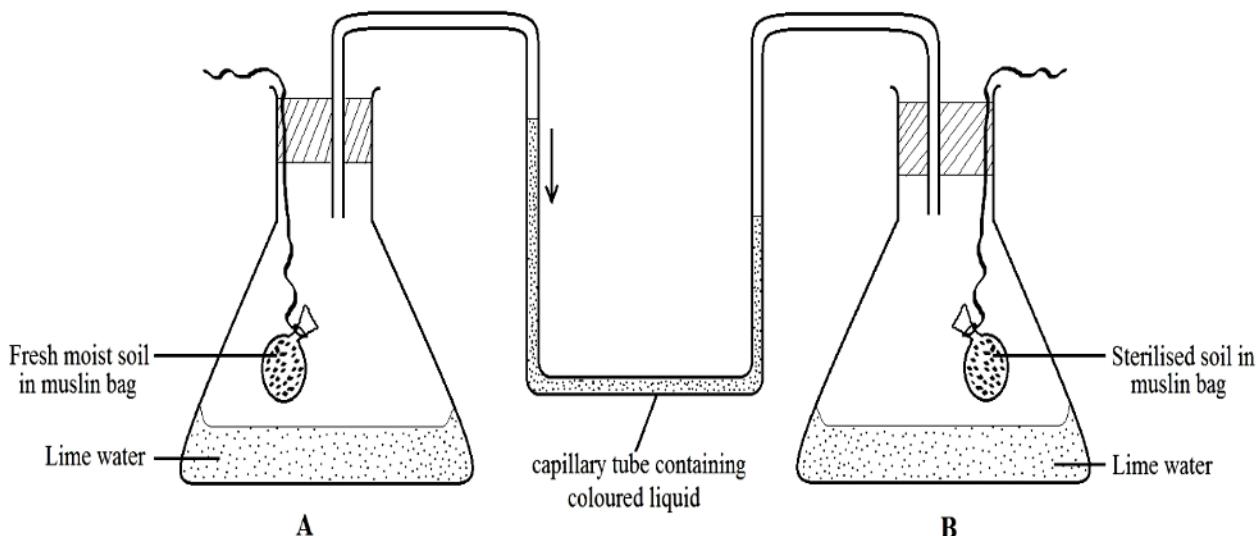
- (i) Explain the differences in the rate of drainage in the two soil samples. (3 mks)
(ii) Calculate the rate of drainage at 40 seconds for each soil sample. (02 marks)
(iii) If 100cm^3 of water was added to each soil sample, calculate the amount of water retained by each soil sample **X** and **Y**. (02 marks)
(iv) Explain the significance of your results in (iii) above to the farmer. (02 marks)
- (b) Explain how
(i) nitrogen is lost from the soil. (03 marks)
(ii) nitrogen is recycled through the activity of soil bacteria and fungi to make it available to plants. (03 marks)

7. In an experiment, two glass tubes were filled with different soil samples A and B. the glass tubes were placed in a basin of water and left to stand for 5 days. The rise of water column in each day for 5 days were recorded as shown in the table below.

Time (days)		1	2	3	4	5
Rise of water column (cm)	Soil sample A	12	16	32	37	38
	Soil sample B	20	24	26	27	27

- (a) What soil factor was being investigated? (01 mark)
- (b) Using the results in the table above, plot a graph showing the rise of water in the two soil samples A and B. (06 marks)
- (c) Describe the rise of water through soil samples A and B as shown on the graph (04 marks)
- (d) Explain the differences in the water rise through the two soil samples. (04 marks)
- (e) Using the rise of water column on the graph for day 1, suggest with a reason the type of soil samples A and B. (02 marks)
- (f) What is the importance of the factors being investigated in plants? (03 marks)

8. The apparatus below was set up by a student. Study it carefully and answer the questions that follow.

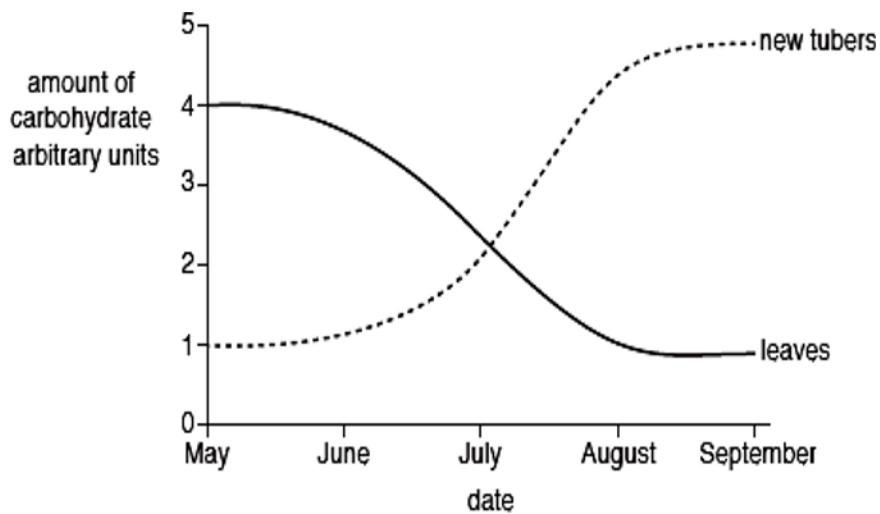


- (a). What was the:
 - (i) aim of the experiment? (01 mark)
 - (ii) use of the lime water in the setup? (01 mark)

- (b). State what would be observed in each flask if the experiment was left to continue for 24 hours. Explain your observations. **(04 marks)**
- (c). Explain why:
- (i) the soil in flask B was sterilised **(01 mark)**
 - (ii) coloured liquid level in the capillary tube dropped. **(02 marks)**
- (d) State one role played by the soil component being investigated in this experiment? **(01 mark)**

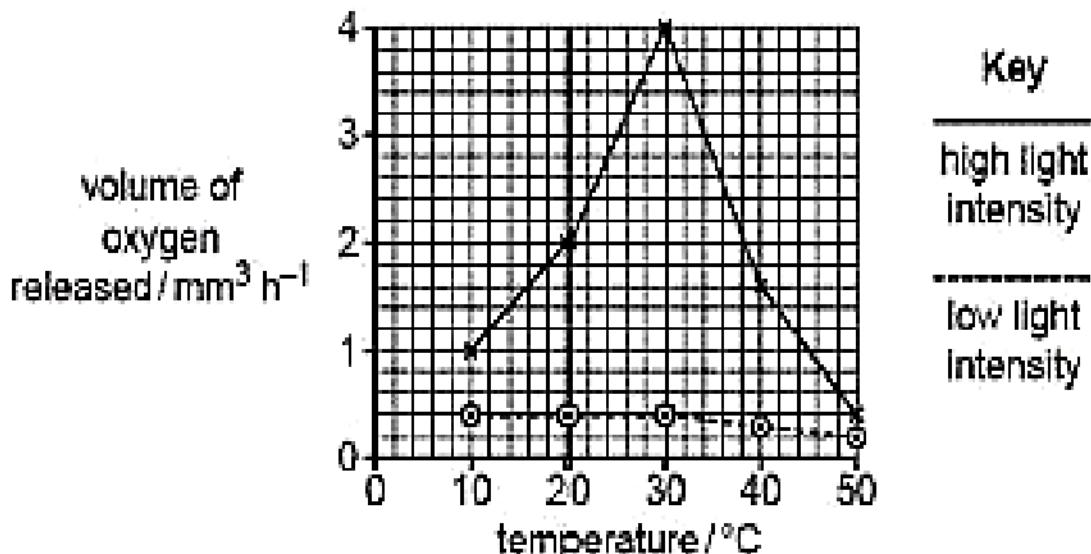
TOPIC 3: ENZYMES & NUTRITION

9. The figure below shows the **amount of carbohydrate** stored in the **leaves** and **new tubers** of potato plants grown in south western part of Uganda between May and September.



- (a) **Compare** the amounts of carbohydrates in tubers and leaves between May and September. **(06 marks)**
- (b) **Explain** the difference in amounts of carbohydrates in tubers and leaves in May and September. **(06 marks)**
- (c) State the **form** in which carbohydrates are stored in potato plants. **(01 mark)**
- (d) State **two** uses other than storage, of the carbohydrates made during photosynthesis. **(02 marks)**
- (e) Give the **adaptations** of potato tubers to survive in their habitats. **(05 marks)**

10. Figure below shows results of an investigation by a senior 2 student of JIPRA on the **effect of temperature and light intensity on the rate of photosynthesis** of an aquatic plant.



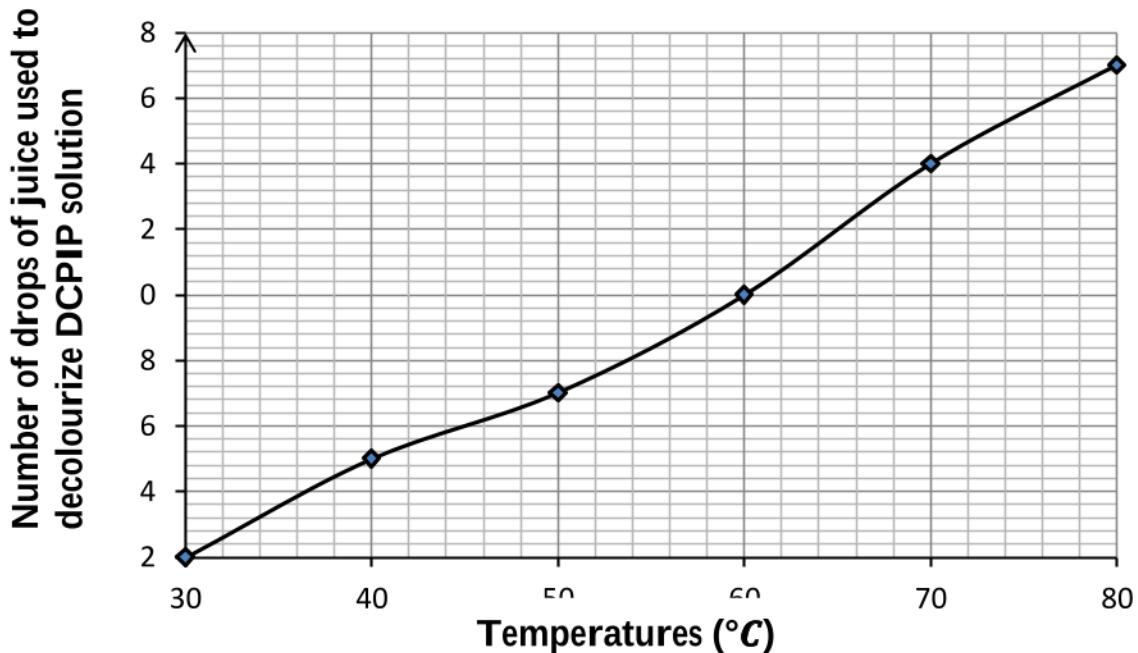
- (a) Describe the **variation** of the rate of photosynthesis with temperature at;
- (i) high light intensity. (05 marks)
 - (ii) low light intensity. (02 marks)
- (b) Explain the **effect of increasing temperature beyond 30°C** on the rate of photosynthesis at high light intensity. (05 marks)
- (c) Explain why the volume of oxygen released from the plant **does not** give a true rate of photosynthesis. (02 marks)
- (d) Apart from the factors investigated in the figure, outline other environmental factors which affect rate of photosynthesis. (03 marks)
- (e) How do plants in shady environments cope with insufficient light? (03 marks)

11. (a) Scientists carried out an experiment to find the effect of cooking cabbage on the vitamin C content in it. Cabbage leaves were placed in boiling water for 10 minutes. The vitamin C content was determined at intervals, expressing it as a percentage of the amount in the uncooked cabbage. The results are shown in table below Study the information and answer the questions that follow.

Time after putting the cabbage in water (Minutes)	Vitamin C content (%)
0	100
0.5	66
1	55
4	49
7	43
10	37

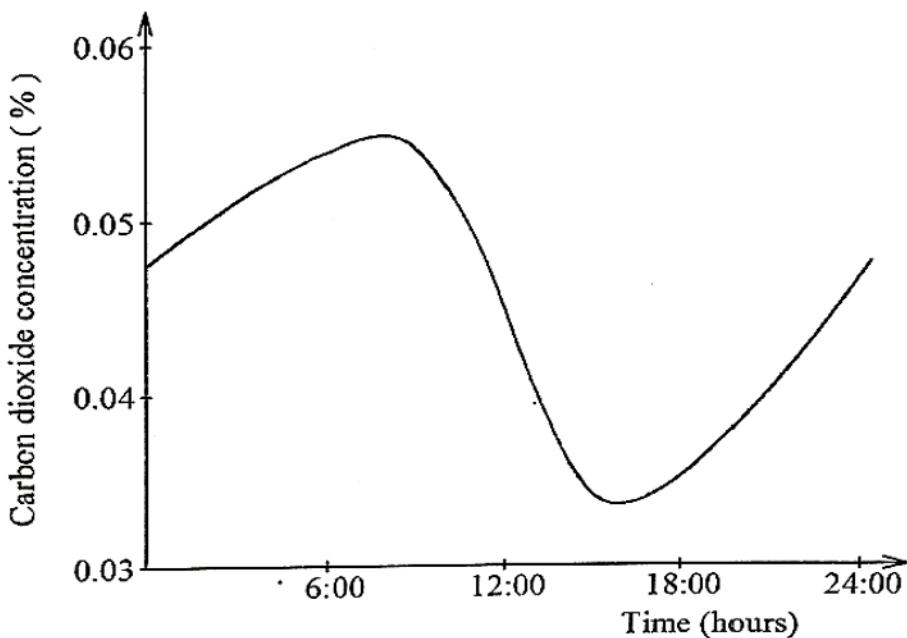
- (i) Plot a graph in the space below to represent the information in table above. **(05marks)**
- (ii) From the graph, describe the effect of boiling time on the vitamin C content in the cabbage. **(02 marks)**
- (iii) Calculate the percentage change in the vitamin C content of cabbage during the period of the experiment. **(01 mark)**
- (iv) Suggest reasons why the vitamin C content in the cabbage changes with boiling time. **(02 marks)**
- (v) Describe an experiment that could be performed to test for and compare the vitamin C content in different solutions. **(03 marks)**
- (vi) From the results of the experiment, what nutritional advice would you give to a vegetarian about feeding on vegetables? **(02 marks)**

(b) In another experiment a certain student separately added 2 cm³ of orange juice to different test tubes incubated in water baths maintained at different temperatures for 10 minutes. He then tested for ascorbic acid in each test tube and counted the number of drops of juice used to decolourize DCPIP solution. The results are shown in the graph below.

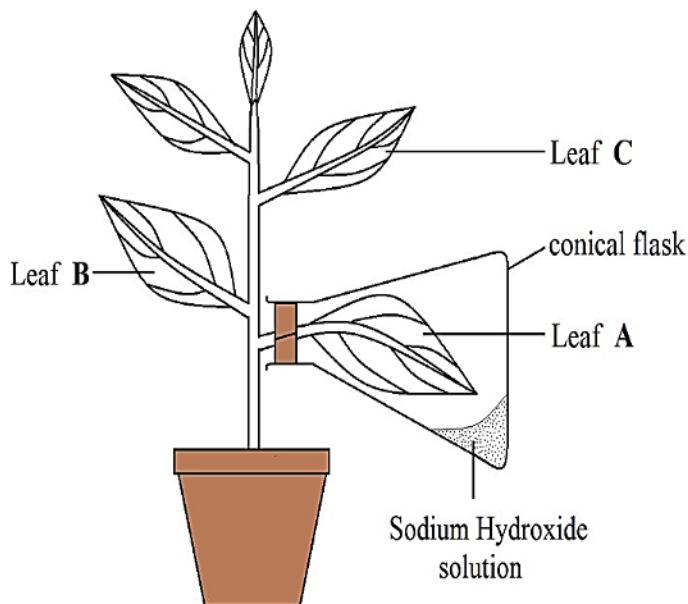


- (i) From the graph, describe the effect of increasing temperature on the concentration of ascorbic acid? **(02 marks)**
- (ii) Explain your answers observed above. **(02 marks)**
- (iii) State the deficiency infection due to lack of ascorbic acid in children **(01 marks)**

12. The figure below shows the amount of carbon dioxide in the air in a forest over a period of 24 hours measured during a sunny day.



- (a) Explain the changes in carbon dioxide concentration:
- (i). between 08:00 hours and 16:00 hours (04 marks)
 - (ii). between 16:00 hours and 24:00 hour (04 marks)
- (b) (i). At what time was carbon dioxide highest? (00½ marks)
- (ii). Why? (03 marks)
- (c) (i). At what time was carbon dioxide lowest? (00½ marks)
- (ii). Why? (03 marks)
- (d) (i). On the same graph above, draw a sketch to show the variation in the concentration of carbon dioxide over the same period of time if the measurement was carried out during a cloudy day. (02 marks)
- (ii). Explain the variation in carbon dioxide concentration in your sketch compared to the original graph. (03 marks)
13. To investigate the effect of carbon dioxide on photosynthesis, a green plant was destarched by leaving it in darkness for 24 hours. After destarching, leaf A was put in a conical flask as shown in the figure below while leaf B was immediately tested for starch. The setup was then left in light for 12 hours after which leaf A and leaf C were tested for starch.

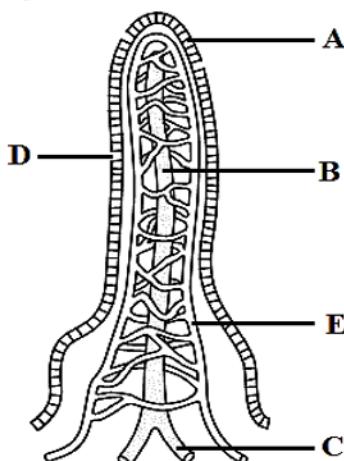


- (a) Why was sodium hydroxide used in the experiment? **(01 mark)**
- (b) State two reasons why when the plant was placed in darkness for 24 hours it became destarched. **(02 marks)**
- (c) State the purpose of including each of leaves B and C in the experiment. **(02 marks)**
- (d) What was observed when each of leaves A, B and C were tested for starch? **(03 marks)**

(e) Give reasons why each of the following are carried out while testing a leaf for starch:

- (i) Put a leaf in boiling water. **(01 mark)**
 (ii) Put a leaf in hot ethanol. **(01 mark)**

14. The figure below shows a structure found in part of the alimentary canal.



- (a) Name the structure shown in the figure, and state the part of the alimentary canal in which it is found **(01 marks)**
- (b) Name the parts labeled A, B, C and D. **(02 marks)**
- (c) What food substances enter parts B and E? **(2mk)**
- (d) Name the blood vessel that connects this structure to the liver. **(01 marks)**

(e) Explain the ways in which this structure is adapted to enable it to carry out its function. **(03 marks)**

15. (a) Describe an experiment to show that light is necessary for photosynthesis. **(10 marks)**

- (b) Explain four (4) ways by which different plant leaves are modified for other functions other than photosynthesis? **(02 marks)**
- (c) State three roles of light in plant growth. **(03 marks)**

16. (a) What is Photosynthesis? **(02 marks)**
- (b) State the two raw materials, two conditions and two products of photosynthesis. **(03 marks)**
- (c) Describe an experiment to show that oxygen is given off as a bi product during photosynthesis. **(10 marks)**

TOPIC 4: TRANSPORT

17. The table shows results of an experiment which was carried out to find out the effect of osmosis on change in length of living plant tissue cylinders immersed in sucrose solutions of different concentrations.

Sucrose concentration (M)	Initial length (cm)	Final length (cm)	Percentage change in length (%)
0.0	2.0	2.3	
0.1	2.0	2.2	
0.2	2.0	2.1	
0.3	2.0	1.9	
0.4	2.0	1.8	
0.5	2.0	1.7	

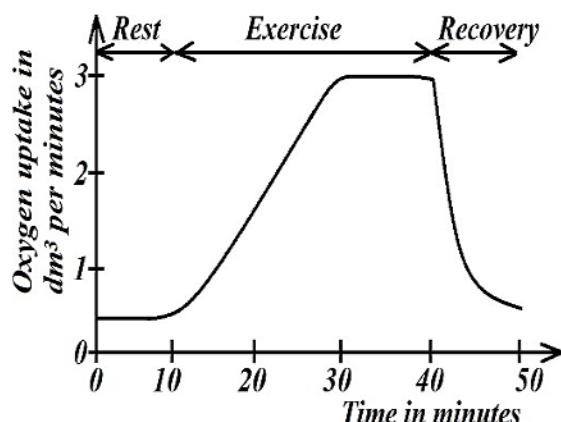
- (a) Complete the table above by calculating percentage change in length. **(03 marks)**
- (b) Plot a graph of percentage change in length against sucrose solution. **(07 marks)**
- (c) From your graph, determine the sucrose solution with the same concentration as that of the cell sap of potato cylinders. **(01 mark)**
- (d) Explain the effect of sucrose solutions on the length of the plant cylinders in the following cases:
- (i) A percentage change in length of less than 0% **(03 marks)**
 - (ii) A percentage change in length of more than 0% **(03 marks)**
- (e) State the **physical conditions** of the potato cylinder removed from 0.0M sucrose solution and state **its significance to the plant**. **(03 marks)**

- 18.** Describe how a molecule of water moves from:
 (a) the soil particles until it reaches the xylem. **(05 marks)**
 (b) the xylem of a tall tree to the atmosphere. **(10 marks)**
- 19.** (a) Describe how glucose from the small intestine is moved to a muscle cell. **(09 marks)**
 (b) Explain how the human circulatory system is adapted to:
 (i) supply oxygen to the tissues **(05 marks)**
 (ii) remove waste products from tissues. **(02 marks)**
- 20.** (a) What is an **artery**? **(01 marks)**
 (b) State **four** structural differences between an artery and a vein. **(04 marks)**
 (c) **Explain** how each one of the following blood vessels are **adapted** to their functions:
 (i) Capillaries **(02 marks)**
 (ii) Veins **(03 marks)**
 (iii) Arteries **(03 marks)**
 (d) Explain why single-celled organisms like amoeba do not need a circulatory system. **(03 marks)**
- 21.** An experiment was carried out to investigate the effect of oxygen concentration on the uptake of phosphate ions by a plant. Plant roots were dipped in a salt solution containing the phosphate ions. A metabolic poison was introduced into the solution when the oxygen concentration was 10 ppm (parts per million). The table below shows the results obtained.
- | concentration of oxygen (ppm) | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 |
|---------------------------------|---|---|----|----|----|----|----|----|
| Total phosphate ion uptake (mg) | 3 | 5 | 20 | 30 | 41 | 49 | 23 | 0 |
- (a) Name the processes by which plant roots absorb phosphate ions. **(02 marks)**
 (b) Plot a suitable graph to represent the data in the table above. **(06 marks)**
 (c) Explain the graph:
 (i). at 0 ppm of oxygen concentration **(03 marks)**
 (ii). between 2 ppm and 10 ppm of oxygen concentration **(03 marks)**
 (iii). between 10 ppm and 14 ppm of oxygen concentration **(02 marks)**
 (d) State two conclusions you can draw from the graph. **(02 marks)**
 (e) State two other factors that affect the rate of ion uptake by the root. **(2 marks)**

22. (a) Describe how red blood cells are adapted to their functions. **(08 marks)**
(b) Describe the changes that occur in the blood if a person moves from a low land and goes to live on a high land. Explain your answer. **(06 marks)**
(c) In what ways are white blood cells different from red blood cells in:
(i) structure? **(02 marks)**
(ii) function? **(01 mark)**

TOPIC 5: GAS EXCHANGE AND TISSUE RESPIRATION

23. The graph below shows the volume of oxygen taken by human before, during and after exercise per minute.

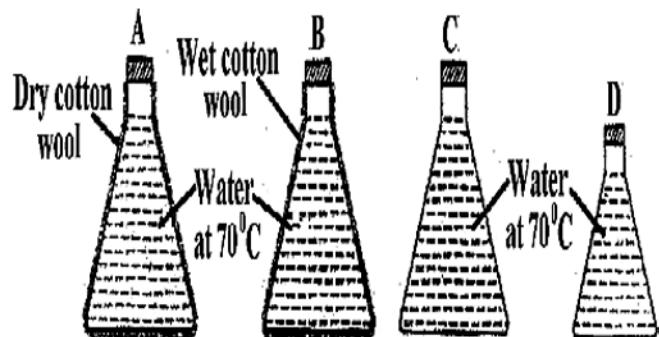


- (a) State the major type of respiration taking place during:
(i) Resting **(01 mark)**
(ii) Exercise **(01 mark)**
(iii) Recovery **(01 mark)**
- (b) Describe the changes in oxygen uptake during:
(i) Exercise **(02 marks)**
(ii) Recovery **(02 marks)**
- (c) Explain the changes in the oxygen uptake during:
(i) Exercise **(04 marks)**
(ii) Recovery **(03 marks)**
- (d) Explain why the ventilation rate increases during exercise. **(03 marks)**
- (e) Suggest why the person's heart rate also changes during exercise. **(03 marks)**

24. (a) **Explain** how the **skin of an amphibian** is suited for its function as a respiratory surface. **(03 marks)**
(b) **Describe** how an amphibian uses the mouth lining for gaseous exchange? **(07 marks)**
(c) **Explain**
(i) **why** the rate of respiration in a toad is higher than in plants? **(02 marks)**
(ii) **how** plants are adapted for gaseous exchange. **(03 marks)**
25. (a) **Explain** how you get fresh air into your lungs. **(09 marks)**
(b) **How** does oxygen in the air in the alveolus reach the heart? **(06 marks)**

TOPIC 6: HOMEOSTASIS, EXCRETION & OSMOREGULATION

26. The figure below shows four flasks **A**, **B**, **C**, **D** each filled with hot water at 70 °C and left to cool. Flask **A** is insulated with a dry cotton wool, flask **B** with wet cotton wool, flask **C** is not insulated, and flask **D** is smaller and not insulated. The flasks represent mammalian bodies.



The table below shows the temperature in each flask in the figure above, recorded at 10-minutes intervals for 30 minutes.

Flask	Temperature (°C) at 10 minutes intervals			
	0 (min)	10 (min)	20 (min)	30 (min)
A	70	66	62	60
B	70	50	38	30
C	70	60	53	48
D	70	53	40	38

- (a) On the same axes, plot a graph to show the changes in temperature in each flask with time. (06 marks)
- (b) Calculate the average rate of cooling in each flask (04 marks)
- (c) Explain the rate of cooling in
- (i) flask A (02 marks)
 - (ii) flask B (02 marks)
 - (iii) flask C (02 marks)
 - (iv) flask D (03 marks)
- (d) From the information, state two factors that affect the rate of cooling from the body (01 marks)

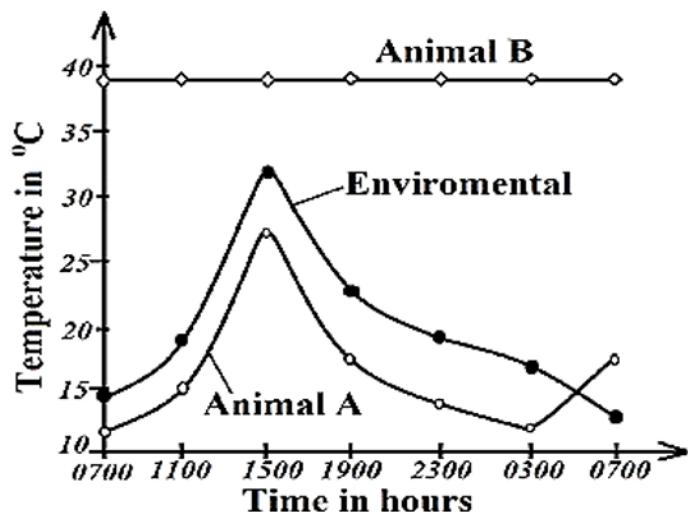
27. An experiment was done with a protozoa living in the sea. The animal forms a contractile vacuole. The number of times contractile vacuole forms and discharges in a period of ten minutes was recorded when the protozoa was placed in seawater with varying concentrations. The results obtained were as shown in the table below.

Number of times the vacuole forms	13	11	10	8	5	4	3	2	1	0
Percentage of salt in Seawater (%)	1.0	1.3	1.5	1.9	2.3	2.7	3.4	3.9	4.7	4.9

- (a) Using the results in the table above, draw a graph showing variation of number of times the vacuole forms in ten minutes with the percentage of salt in seawater **(09 marks)**
- (b) Using your graph in (a) above, determine the percentage of salt in seawater that enable the protozoa to form six vacuoles in 10 minutes. **(01 mark)**
- (c) State the relationship present between the concentration of seawater and the number of times vacuole forms in ten minutes **(01 mark)**
- (d) Explain the relationship stated in (c) above. **(04 marks)**
- (e) Explain what would happen to the protozoa if it was placed in seawater whose percentage of salt was 6.5 for 1 hour. **(02 marks)**
- (f) State any two substances the contractile vacuole removes from a protozoan. **(02 marks)**

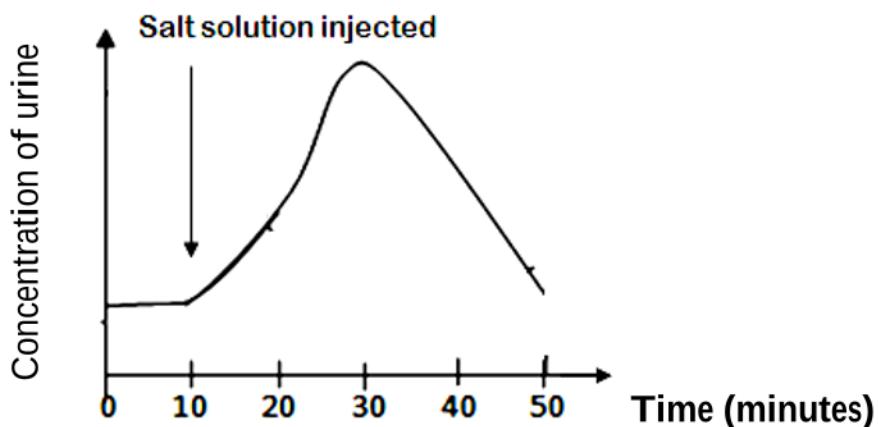
28. The figure below shows graphs of body temperature of animals A and B plus the environmental temperature plotted against time of the day.

- (a) What is the relationship between environmental temperature and the body temperature of each animal? **(02 marks)**
- (b) Explain the relationship between environmental temperature and the body temperature of each animal. **(02 marks)**



- (c) From the graphs predict and explain how active the animals A and B would be at night time. **(05 marks)**
- (d) What advantage does this give one animal over the other in respect of being active? **(04 marks)**
- (e) Explain the adaptations of thin bodied organisms to living in extreme cold conditions? **(06 marks)**

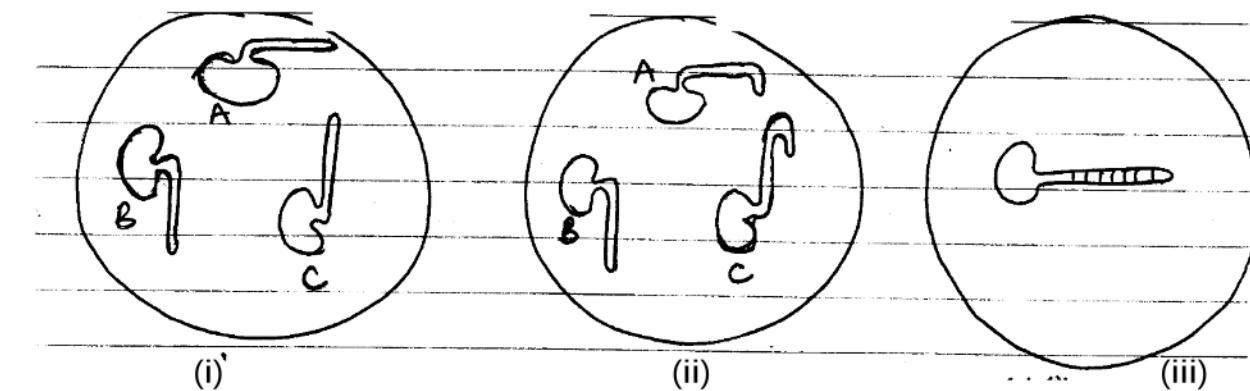
29. An experiment was carried out on a dog which was made to drink water to full capacity. Measurements were then taken to determine the changes in the concentration of urine. After ten minutes, a salt solution, hypertonic to the blood plasma was injected into its carotid artery. Measurements were continued for another 40 minutes. The graph below shows the results of the investigations.



- (a) Describe the effect of injection of salt solution on the concentration of urine **(03 marks)**
- (b) Explain the effect of the injection of the salt solution on the concentration of urine. **(10 marks)**
- (c) Why is it important to maintain a constant level of salt in the blood? **(02 marks)**
- (d) State five adaptations of terrestrial animals for conserving water. **(05 marks)**

TOPIC 7: COORDINATION

30. Three germinating beans with straight radicles were placed in a petridish containing moist cotton wool as shown in (i) below. The dish was kept in a vertical position for 2 days in the dark. The appearance of the beans after 2 days is shown in (ii) below.



- (a) State the change that was observed in all the radicles A, B & C. **(01 mark)**
- (b) Petridish (iii) was put in a clinostat which kept rotating. Explain the expected results after two days. **(02 marks)**
- (c) The seedling in petridish (iii) had equally spaced marks in Indian ink along its length at the beginning of the experiment. Draw a diagram to show the appearance of the marks after two days. **(1 ½ marks)**
- (d) Explain this appearance. **(03 marks)**

- 31.** Two individual A and B were found to be suffering from different eye defects. The percentage level of accommodation of a potted plant placed in a corner of clearly lit room was determined by adjusting the distance of each individual from the potted plant and the results were obtained in the table below.

Distance from the potted plant /cm	10	20	30	40	50	60	70	80	90
Percentage level of accommodation by A	100	80	60	55	50	44	37	0	0
Percentage level of accommodation by B	0	0	20	40	50	60	70	85	100

- (a) Plot a suitable graph to represent the information in Table 1. **(08 marks)**
- (b) Explain the effect of increasing distance on the accommodation of individual:

- (i) A **(03 marks)**
- (ii) B **(03 marks)**

- (c) Explain how the effect mentioned above can be corrected and overcome in:

- (i) A **(03 marks)**
- (ii) B **(03 marks)**

- 32.** (a). What is **sensitivity?** **(01 marks)**
- (b). John sees a snake and runs away immediately shouting “a snake, a snake”. His friend Tom ran out to help him.
- (i) Explain how the nervous system and the adrenal glands work together to bring about the action by John. **(05 marks)**
- (ii) State the voluntary and involuntary actions that were involved. **(02 marks)**
- (iii) Explain how sound waves reached the auditory nerves of Tom. **(07 marks)**

TOPIC 8: SUPPORT AND LOCOMOTION

- 33.** (a) Explain how each of the following is achieved during movement of the Tilapia fish in water.
- (i) Reduced water resistance. (02 marks)
 - (ii) Coming on the surface to feed (02 marks)
 - (iii) Braking in case it has been moving fast. (02 marks)
- (b) Birds have been found to enjoy aerial life without difficulty. State four structural adaptations that have enabled birds to live an aerial life. (04 marks)
- 34.** (a) Of what advantage is the endoskeleton over the exoskeleton? (04 marks)
- (b) With the aid of a labeled diagram describe how the human arm can bend and straighten. (11 marks)

TOPIC 9: GROWTH & DEVELOPMENT

- 35.** An analytical study was carried out to investigate the fluctuation of the population of bacteria cells grown in a culture solution closed in a clean bottle maintained at 37°C for a period of 24 hours. The results were obtained as shown below.

Time in hours	0	5	10	12	30	35
Number of bacteria cells in arbitrary units	9	18	400	550	550	225

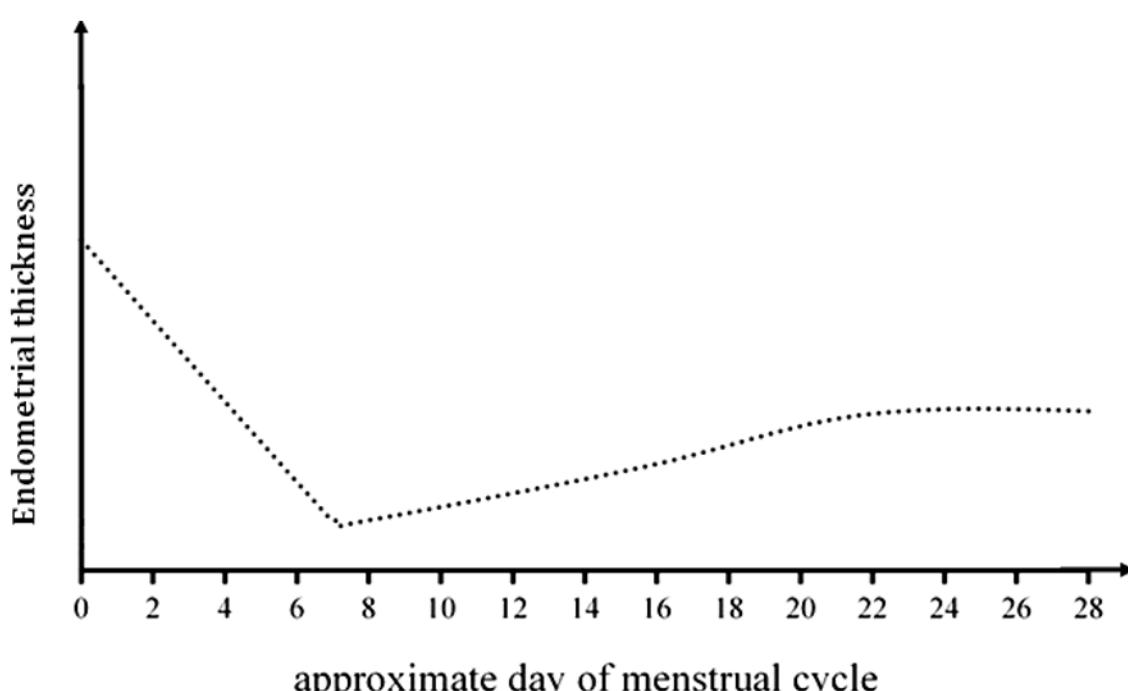
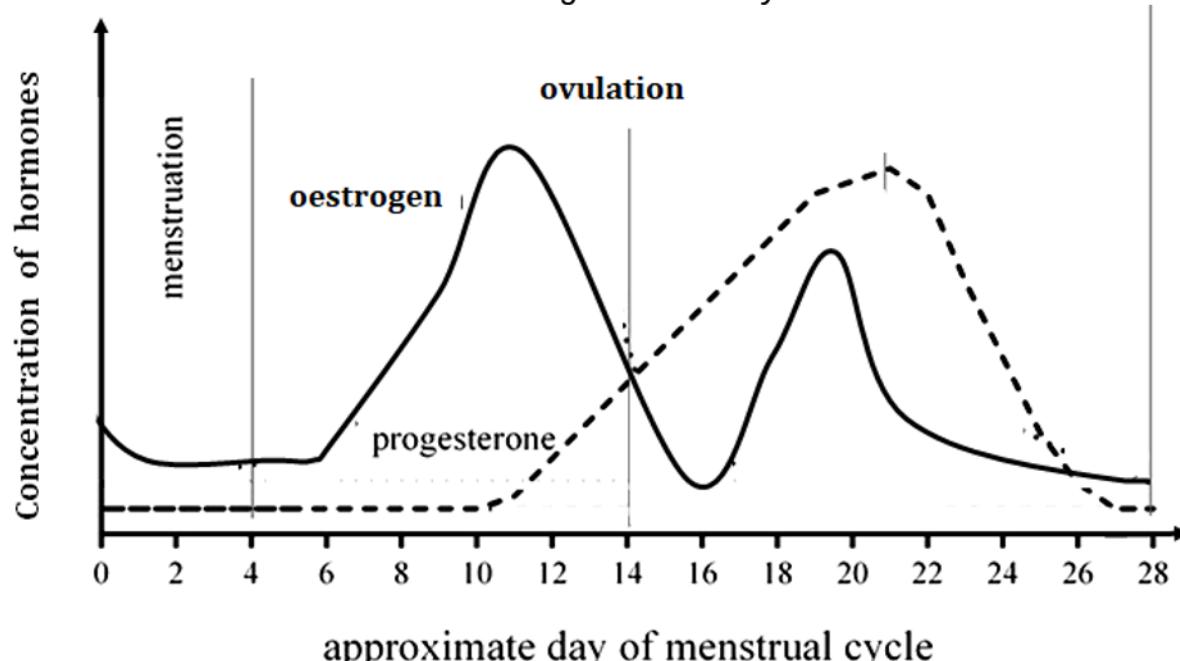
- (a) Represent the above information on a suitable graph
- (b) Describe and explain the shape of the graph
- (c) Explain why the bottle was closed and maintained at 37°C
- (d) Explain what would happen to the bacterial cells if the temperature of the bottle was lowered to 0°C after the 12th hour.
- 36.** A farmer wished to plant a certain species of nitrogen fixing trees in his garden. However, the seeds normally take long to germinate after sowing. To overcome this problem, he soaked several seeds in hot water at 50°C. Batches of 20 seeds were soaked in water and removed at one-minute interval and then planted in trays containing moist soils. After 15 days the numbers of seedlings that grew in each tray were counted. The results obtained are shown in the table below.

Batch number	1	2	3	4	5	6	7	8	9	10	11
Time (minutes)	0	1	2	3	4	5	6	7	8	9	10
Germinated seeds	3	3	8	15	18	13	10	6	2	0	0
% germination											

- (a) (i) Calculate the percentage germination for each batch and fill in the table above **(2½ marks)**
(ii) Use your results in (a) (i) to plot a graph showing how the percentage germination varied with the duration of soaking in hot water. **(07 ½ marks)**
- (b) From your graph calculate the expected number of seeds that would germinate if seeds were soaked for 4 ½ minutes. **(02 marks)**
- (c) Using the graph briefly describe the effect of hot water on the seeds of the plants. **(04 marks)**
- (d) Explain the difference in the germination success between seeds soaked in hot water for up to 8 minutes and those not soaked. **(02 marks)**
- (e) Explain why there was no germination of seeds soaked for 9 to 10 minutes. **(02 marks)**
- (f) Besides hot water treatment, suggest another method that could be used to speed up the germination in such plants. **(01 mark)**

TOPIC 10: REPRODUCTION

37. The graphs below show the changes in the concentration of oestrogen and progesterone hormones in the blood of a woman, together with the corresponding thickness of the endometrium during menstrual cycle.



- (a) Explain the variation in the concentration of oestrogen and progesterone with days of the menstrual cycle

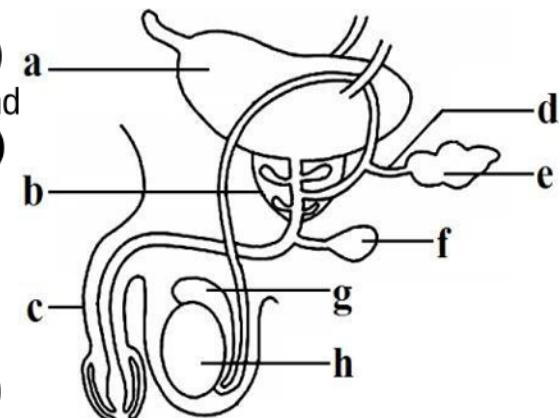
- (i) oestrogen
(ii) progesterone

(06 marks)
(06 marks)

- (b) Explain the changes in the thickness of the endometrium during the menstrual cycle. **(04 marks)**
- (c) If there was regular sexual intercourse, suggest the fate of the woman's egg:
- (i) between day 11 and day 17 **(01 mark)**
 - (ii) between day 17 and day 28 **(01 mark)**
- (d) Oestrogen and progesterone are usually manufactured then combined for use as contraceptive pills. Explain how their combination achieves contraception. **(02 marks)**

38. The figure on the right shows a lateral view of human male reproductive system.

- (a) Name the parts labelled **a** to **f**. **(03 marks)**
- (b) State the functions of parts labelled **c**, **g** and **h**. **(03 marks)**
- (c) Using letter "X" and "Y" respectively, indicate on the figure the:
- (i) site for vasectomy. **(01 mark)**
 - (ii) most sensitive site of sex arousal. **(01 mark)**



- (d) Explain why a vasectomised male can erect while a castrated male cannot and yet the two cannot make a woman pregnant. **(02 marks)**

39. (a). What is meant by **double fertilization** as used in plant reproduction? **(02 marks)**
- (b). Describe the events that lead to double fertilization in flowering plants. **(09 marks)**
- (c). Outline the changes that follow successful fertilization in flowering plants. **(04 marks)**

40. A certain couple is unable to conceive a child after one year of their marriage.

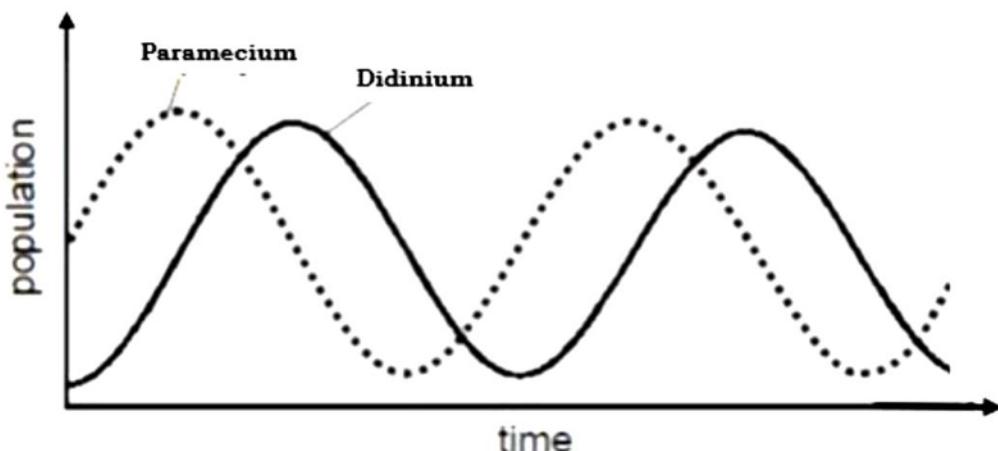
- (a) What could be the likely cause of failure to conceive a child? **(10 marks)**
- (b) What lifestyle changes should the couple adopt in order to increase their chances of conceiving a child? **(05 marks)**

TOPIC 11: CELL DIVISION, HEREDITY AND EVOLUTION

- 41.** A normal couple produced twins when one of the twins is an albino.
- (a) Explain why
- (i) parents with normal skin colour produced an albino. **(03 marks)**
(ii) only one of the twins from the same pregnancy was an albino. **(02 marks)**
- (b) Using suitable symbols, carry out a genetic cross to illustrate the difference in skin colour of the twins **(05 marks)**
- 42.** (a) Outline three changes that take place in a cell in preparation for mitosis. **(03 marks)**
(b) What is the importance of mitosis and meiosis to living things? **(05 marks)**
(c) Illustrating with a cell of one pair of homologous chromosomes, draw a diagram to show mitotic metaphase. **(02 marks)**
- 43.** (a) What is an allele? **(02 marks)**
(b) In a breeding experiment, plants which were homozygous for producing white flowers were crossed with those homozygous for producing red flowers. The F₁ off springs were all pink.
(i) Explain the results observed among the F₁ plants. **(02 marks)**
(ii) Using appropriate genetic symbols show the formation of F₂ offspring. Indicate their genotype and phenotype ratios. **(06 marks)**

TOPIC 12: ECOLOGY

44. The graph below shows the relationship between paramecium and didinium introduced into a culture at the same time under natural environmental conditions.



- (a) State the relationship between the paramecium and the didinium (01 mark)
- (b) Explain the pattern of variation of the populations of the paramecium and didinium as shown by the graph above. (07 marks)
- (c) Using the information in the graph, draw a pyramid of numbers to represent the relationship between paramecium and didinium. (02 marks)
45. (a) What is pollution? (01mark)
- (b) Explain how each of the following processes pollutes water bodies
- (i) discharge of hot water (03 marks)
 - (ii) discharge of untreated sewage (06 marks)
46. (a) Distinguish between;
- (i) Mutualism and Commensalism (02 marks)
 - (ii). Predation and Parasitism. (02 marks)
- (b) With examples in each case, describe how parasites are adapted to their mode of life. (11 marks)

PRACTICAL (PAPER 2 / PAPER 3) QUESTIONS

47. You are provided with **P**, **Q**, and **R** containing food nutrients.

(a) You are required to carry out the tests on the food nutrients following the procedures provided:

- Label three boiling tubes (1), (2) and (3) respectively and add 10cm³ of distilled water to each.
- Wet the visking tubes for easy opening
- Carefully tie one end of each visking tube provided using the thread provided.
- To the first visking tube, add 2cm³ of **P** and then tie the remaining end. Place it in the boiling tube labeled (1).
- To the second visking tube, add 2cm³ of **Q** and tie the other end. Then place it in the boiling tube labeled (2).
- To the third visking tube, add 2cm³ of **P** and 3 drops of **R** and tie it. Then place it into the boiling tube labeled (3).
- Place all the boiling tubes in a water bath maintained at 35°C - 40°C for 10 minutes.
- After which carry out the experiments below and record your observations and deductions in the table below:

(09 marks)

TEST	OBSERVATION	DEDUCTION
(i) To 1cm ³ of the distilled water in the boiling tube (1), add 1cm ³ of Benedict's solution and boil.		
(ii) To 1cm ³ of the distilled water in the boiling tube (2), add 1 cm ³ of Benedict's solution and boil.		
(iii) To 1cm ³ of the distilled water in the boiling tube (3), add 1cm ³ of Benedict's solution and boil.		

(b) Explain your results in test tubes **1, 2 and 3**.

- (i) **Test tube (1).** **(02 marks)**
- (ii) **Test tube (2)** **(02 marks)**
- (iii) **Test tube (3)** **(03 marks)**

- (c) (i) Suggest the nature of the visking tube, giving a reason to support your answer. **(02 marks)**
- (ii) From your results, state one factor of the physiological process under investigation giving a reason for your answer. **(02 marks)**

48. You are provided with **W**, **X**, **Y** and **Z** which are plant parts. Cut a transverse section of specimen **W** and longitudinal section of specimen **Z**, and then open specimen **X** and **Y** longitudinally.

Examine them carefully and use them to answer the questions that follow:

- (a) Identify each specimen giving a reason to support your answer in each case. **(04 marks)**
- (b) Using observable features of each specimen, describe the characteristic features of **W**, **X**, **Y** and **Z**. **(04 marks)**
- (c) Using the characteristic features described above, construct a dichotomous key. **(03 marks)**
- (d) Using observable structures, describe how specimens **W** and **Y** are dispersed.
- (e) In the space provided, make a well labeled drawing of longitudinal section through specimen **Z**. **(05 marks)**

49. You are provided with specimens **A** and **B** which are obtained from the same animal. Examine them carefully and use them to answer the questions that follow:

- (a) Identify each specimen, stating the region of the body from which it was obtained. **(03 marks)**
- (b) Using observable features, describe the characteristic features of specimen **A** and specimen **B**.
- (i) Specimen **A** **(04 marks)**
- (ii) Specimen **B** **(04 marks)**
- (c) (i) Identify the back bone which articulate with specimen **A** at the anterior and posterior. **(02 marks)**
- At the anterior :
- At the posterior :

- (ii) Using observable features, describe how specimen A is adapted for its functions. **(03 marks)**
- (d) In the space provided, make a well labeled drawing of the anterior view of specimen B and indicate your magnification. **(06 marks)**

CONFIDENTIAL

P is 3% starch solution, **Q** is 1% glucose solution, **R** is 1% amylase enzyme solution
W is mature tomato / orange fruit, **X** is mature bean pod, **Y** is mature desmodium fruit,
Z is mature avocado fruit, **A** is cervical vertebra and **B** is lumbar vertebra.

BIOLOGY DEPARTMENT JIPRA

1. MR. OJARA APOLLO
2. MR. SITATI ROBERT
3. MR. ORIKUMANYA JOHN BOSCO
4. MR. KIBOOME JOSEPH
5. MR. TEGIIKE NOA

DISCLAIMER

These questions are similar in style to that presented *in previous exam board's assessment material*. There can be no guarantee of the extent to which these questions will reflect the actual examinations students will sit. We hope that schools and students find these questions useful in the exam preparations for this year. However, we take no responsibility for the relevance of the document to actual examinations sat.

Thank you for attending the seminar.

END.