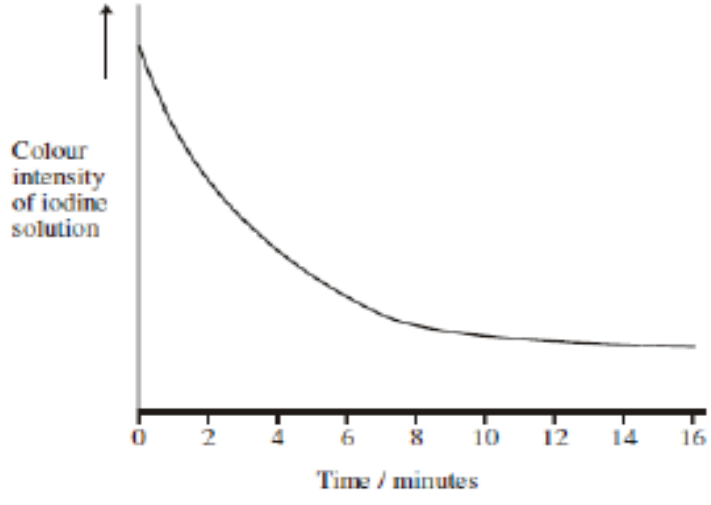
MIDLAND HIGH SCHOOL-KAWEMPE
'O' LEVEL BIOLOGY SEMINAR
SUNDAY 12TH JUNE, 2022
SECTION B: STRUCTURED QUESTIONS

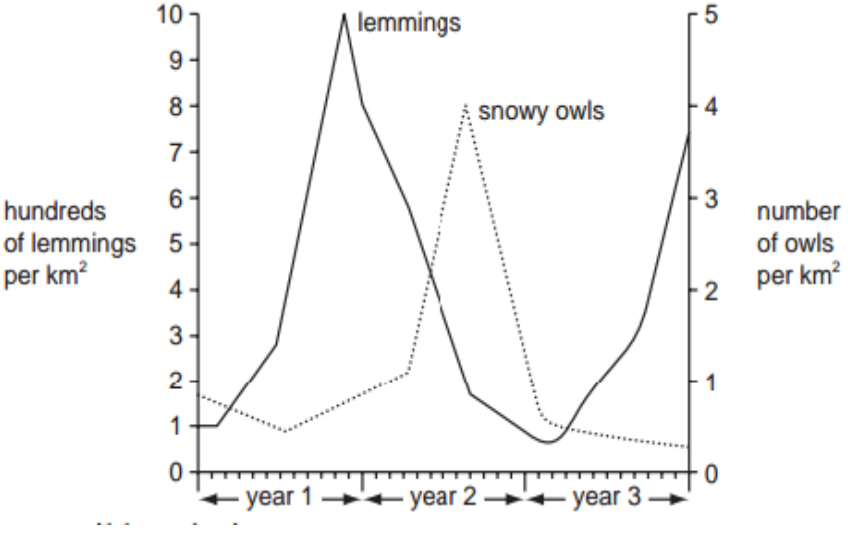
SECTION B PART 1: DATA ANAYLYSIS QUESTIONS

1. In an investigation into the catalytic action of **carbohydrase** enzyme, the contents from part of alimentary canal of a small animal were collected, added to starch solution at pH 7.0, and kept in a water bath at 25℃. At one-minute intervals, samples were removed and added to different test tubes containing dilute iodine solution. The colour intensity of each sample was determined. Figure below shows the results.



(a). State the observations obtained at
(i) O minutes
(ii) 16minutes
(b) Explain your answers in (a) above.
(c) On the same graph, sketch clearly labeled curves showing expected results if the experiment was repeated at
(i) 35℃.
(ii) pH 2
(d) Explain how the following affected the action of carbohydrase enzyme.
(i) Raising temperature from 25℃ to 35℃.
(ii) Decreasing pH from 7.0 to 2.0

2. Figure below shows changes in the population of snowy owls and lemmings over a three-year period.



(a). Giving a reason, identify the prey and predator.
(b). Describe the pattern of population of lemmings over the three-year period.
(c) Explain the pattern of the population of lemmings over the first two years.
(d) Of what significance is the relationship between lemmings and snowy owls to the ecosystem?
(f) What other factors would affect the population of snowy owls in the ecosystem? 1

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

Experiment	Treatment	Percentage of germination
1	Seeds placed in highly closed container with pyrogallic acid.	0
2	Seeds kept in petri dish in light.	96
3	Seeds kept in petri dish in darkness.	97
4	Seeds kept in a fridge at 4°C.	0.5
5	Seeds kept in oven at 60°C.	0
6	Seeds kept at 35°C.	92
7	Dry seeds in a closed container.	0
8	Moist seeds in a closed container.	87

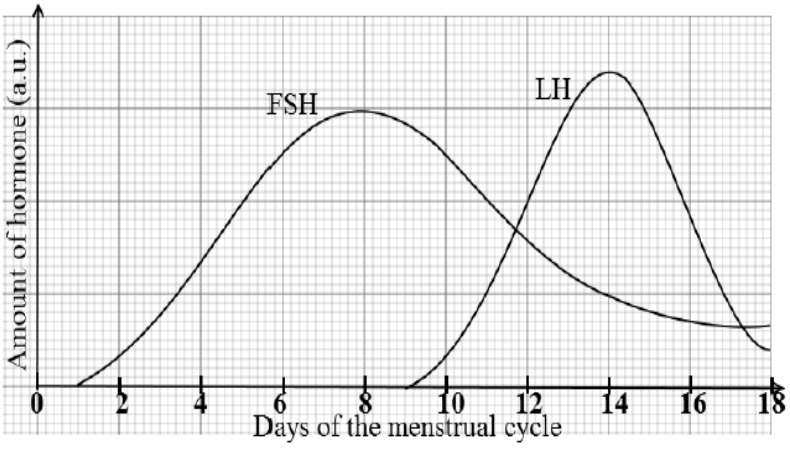
(a) Explain 0% germination in experiment 1,5 and 7. **(6 marks)**

(b) Why are the results of experiment 2 and 3 not significantly different? **(2 marks)**

(c) Explain the difference in results of experiments 4 and 6. **(4 marks)**

(d) From the experiment, what are the conditions necessary for germination? Explain the importance of each condition. **(06 marks)**

(e) What is the importance of tilling land before planting seeds? **(2 marks)**



4. The graph below shows the relative amounts of follicle stimulating hormone (FSH) and luteinising hormone (LH) in the blood stream of a woman during the first 18 days of the menstrual cycle.

(a) Describe how the amounts of the two hormones change during the period shown. **(5 marks)**

(b) State the organ which

(ii) secretes the two hormones. **(1 mark)**

(iii) is affected by the two hormones. **(01 mark)**

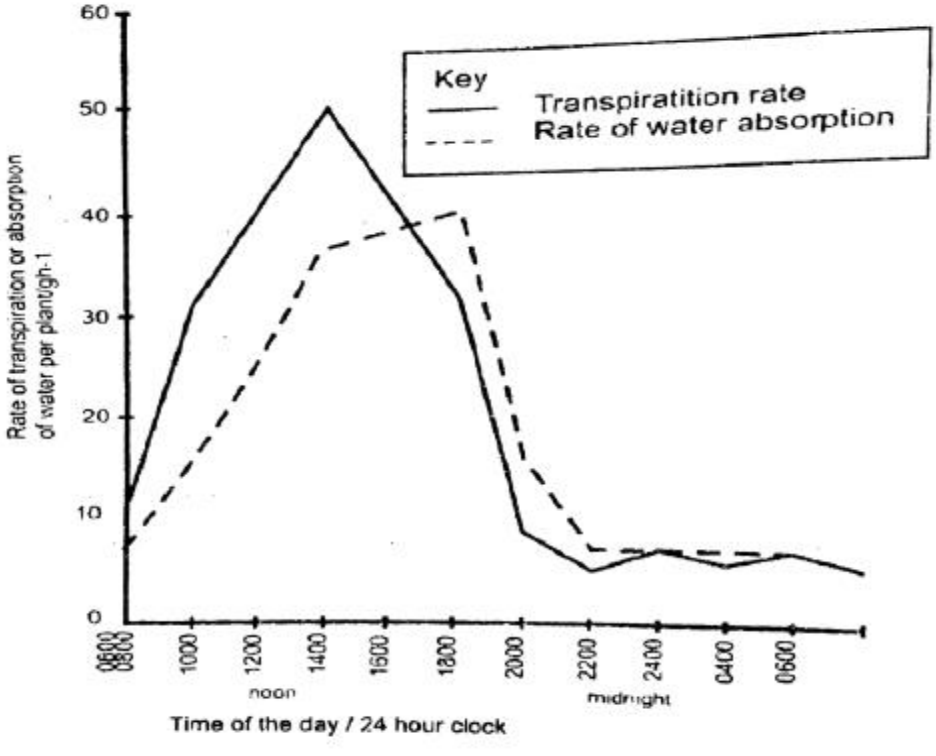
(c) Describe the effects of the two hormones on their target organ. **(4 marks)**

(d) Why is it important for human menstrual periods to stop during pregnancy? **(03 marks)**

(e) (i) Explain how women can use the knowledge of menstrual cycle to avoid conception. **(04 marks)**

(ii) Comment on the reliability of natural methods of family planning. **(02 marks)**

5. An investigation was carried out into the relationship between the rate of water absorption and the rate of transpiration in sunflower plants at various times of the day. The results are shown in the diagram below.



(a) Describe the change in the rate of water absorption from 08.00hours to 20.00hours **(3marks** 2

(a) What are the differences in the changes in the rate of water absorption and the rate of transpiration from 08.00 hours to 20.00 hours? **(3marks)**

(b) Account for the changes in the rate of transpiration that took place.

(i) From 08.00 hours to 14.00 hours. **(4marks)**

(ii) From 14.00 hours to 20.00 hours. **(4marks)**

(iii) From 20.00 hours to 06.00 hours. **(3marks)**

(c) Explain the relationship between the changes in the rate of water absorption and the rate of transpiration. **(3marks)**

6. The composition of blood passing through the uterine vessels during pregnancy was analysed and the results presented in the table as shown below.

	% composition			
Substrate analysed	Uterine artery	Umbilical artery	Uterine vein	Umbilical vein
Oxygen	90	10	10	70
Carbon dioxide	8	75	80	12
Glucose	90	2	2	80
Urea	20	60	80	12
Amino acids	75	15	20	75

(a) (i) Name the structure that allows exchange of substances between the uterine vessels and umbilical vessels. **(1 mark)**

(ii) State three adaptations of the structure mentioned in (a) that allows exchange of substances by diffusion. **(3 marks)**

(b) State five functions of the structure in (a) (i) above. **(2 ½ marks)**

(c) State the directions of blood flow in the: **(2 marks)**

(i) Uterine artery (ii) Uterine vein (iii) Umbilical artery (iv) Umbilical vein.

(d) State five differences between the composition of blood in the umbilical artery and umbilical vein. **(2 ½ marks)**

(e) Give reasons for each of the differences stated in (e) (i) above. **(5 marks)**

(f) (i) Explain why the uterine vein has higher concentration of carbon dioxide than the uterine artery. **(2 marks)**

(ii) Explain why the uterine vein has the highest composition of urea than all other blood vessels. **(2 marks)**

7. A suspension of yeast was added to a dilute sucrose solution and kept at 25°C for 16 days. Each day 10cm^3 samples withdrawn and the number of yeast cells counted. On the fifth day, a small quality of a culture of paramecium was added. The results of the experiment are shown in the table below.

Days	Number of yeast counted	Number of paramecium counted
1	20	0
2	84	0
3	224	0
4	264	0
5	266	30
6	224	150
7	144	168
8	154	76
9	222	72
10	218	138
11	120	162
12	84	96
13	180	54
14	178	90
15	120	144
16	60	120

3

(a) Plot a graph on the same axes to show how the number of yeast cells and paramecium vary during the period of the experiment. **(8 marks)**

(b) Name the relationship illustrated by this experiment. **(1 mark)**

(c) From your answer in (b) above, what type of organism is: **(2 marks)**

(i) Yeast (ii) Paramecium

(d) Explain the changes taking place in the population of the two organisms over the period of study. **(6 marks)**

(c) Name the shape of the graph that would be obtained if the yeast had been cultured alone. **(1 mark)**

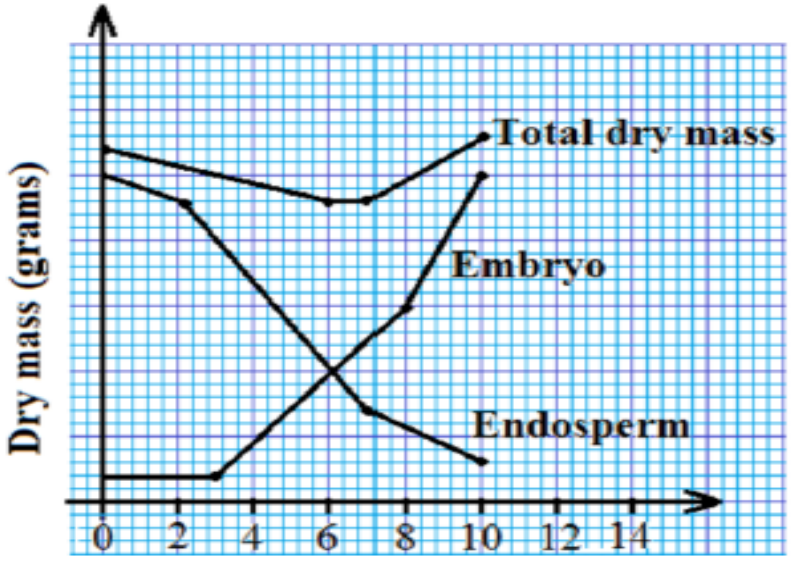
(f) Explain why the growth of human population differs from that of wild life? **(2 marks)**

8. An investigation was carried out into the relationship between the rate of water absorption and the rate of transpiration in sweat potato plant at various times of the day. The results are presented in the table below;

Time (hrs.)	0800	1000	1200	1400	1600	1800	2000	2200	2400	0200	0400	0600
Rate of water absorption ghr^{-1}	11	15	26	36	38	40	15	06	06	06	06	06
Rate of transpiration ghr^{-1}	08	32	42	51	42	32	08	05	06	05	06	5.5

i. Represent the above data graphically
ii. Describe the nature of the graph above
iii. Suggest why these changes occurred
iv. Comment on the relationship between the rate of transpiration and the rate of water absorption during the experiment
v. List the functions of transpiration

9. The graph below shows the relative changes in dry mass of the endosperm and embryo during germination of maize in a well illuminated environment.



(a)Compare the dry mas of the endosperm and embryo. **(02marks)**
(b)Explain the changes in each of the following during germination of maize
(i)Drymass of endosperm. **(06 marks)**
(ii)Dry mass of embryo**(06 marks)**
(iii)Total dry mass. **(06 marks)**

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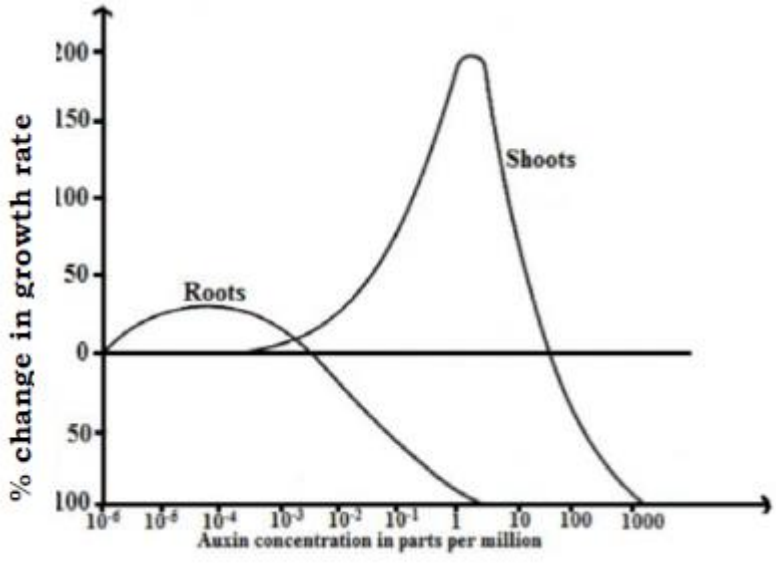
10. The Table below shows the environment temperature and body temperature of animal A and B. Both animals were exposed to the same environmental temperature for a period of 12 hours.

	Temperature (°C)		
Time in hours	**Environment**	**Mammal A**	**Mammal B**
7:00am	10	37	12
8:00am	14	37	16
9:00am	20	37	22
10:00am	24	37	26
11:00am	30	37	28
12:00pm	36	37	36
1:00am	32	37	34
2:00pm	28	37	26
3:00pm	22	37	20
4:00pm	21	37	20
5:00pm	21	37	20
6:00pm	21	37	20

(a) Plot a graph of temperature with time **(8 marks)**
(b) Describe how the body temperature of the mammals varies with environmental temperature. **(6 marks)**
(c) Describe how animal A maintains a constant body temperature. **(4mark)**
(d) What advantages does animal A has over animal B? **(2 marks).**

11. The graph below shows the extra growth of in length in general of roots and shoots of oat seedlings in response to increasing concentration of auxins.



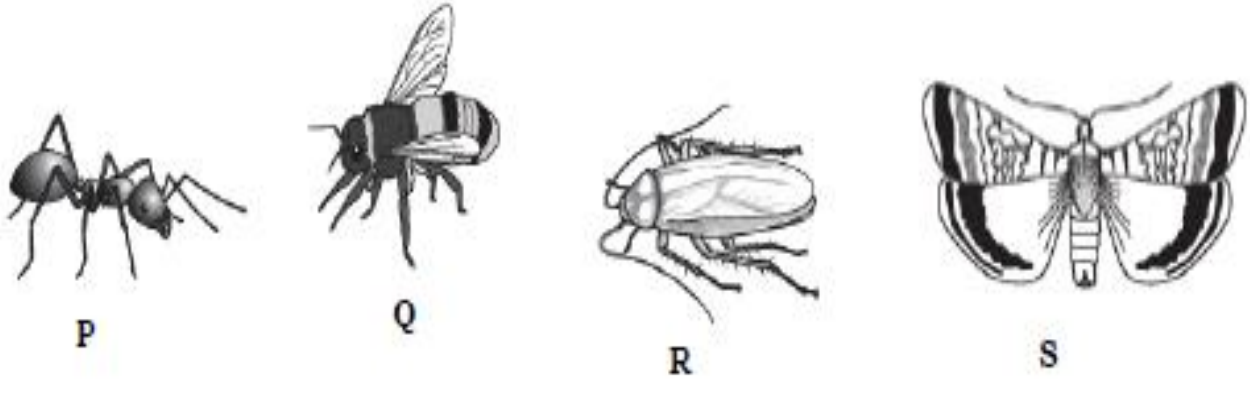
(a)What is the optimum concentration of auxin for (i) roots (ii) stems
(b).Give differences between the shoot and root responses shown by the graph
(c)Describe how the action of auxins on a plant shoot promote growth.
(d)Explain why auxins may be used as selective weed killers in cereal crops.

12. 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 370C for a period of 24 hours. The results were obtained as shown below;

Time in hours	0	5	10	12	30	35	45
Number of bacteria cells in arbitrary units	9	18	400	550	550	225	30

(i) Represent the above information on a suitable graph
(ii) Describe and explain the shape of the graph
(iii) Explain why the bottle was closed and maintained at 37°C
(iv) Explain what would happen to the bacterial cells if the temperature of the bottle was lowered to 0°C after the 12th hour.

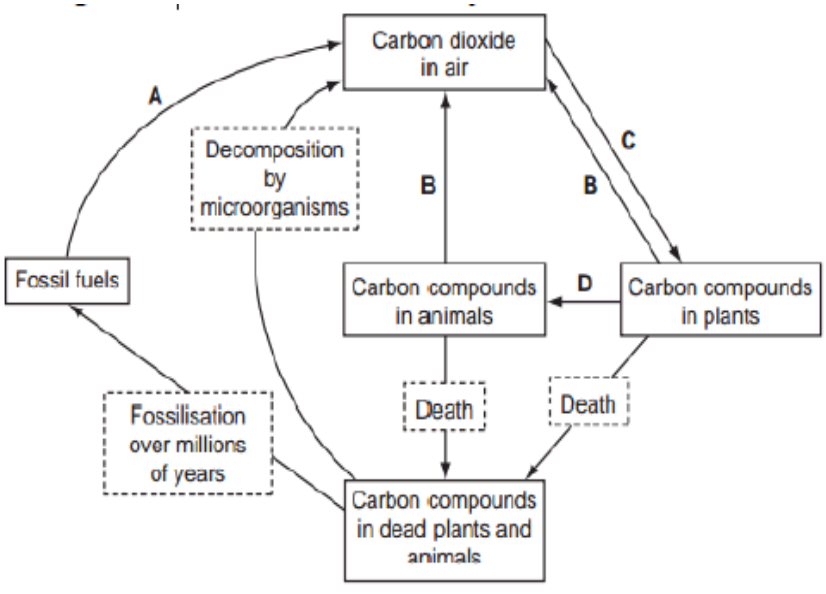
13. Study the specimens below and answer the questions below.



(a) With reasons, state the
(i) Class
(ii) Phylum in which the organisms belong
(b) Describe the structural features of the head and wings of the above specimens.
(c) Using the structural features of the head and wings in (b) above, construct a dichotomous key to identify the specimens.
(d) Outline structural differences between specimen **S** and a butterfly.

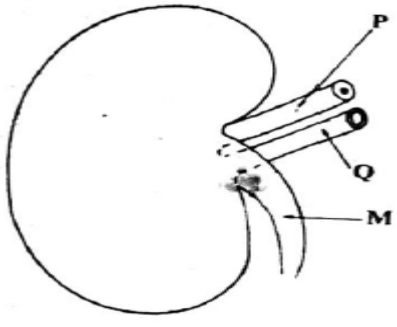
SECTION B PART 2: SHORT ANSWER QUSTIONS

14. Figure below shows the carbon cycle.



(a) (i) What is carbon cycle?
(ii)Name the processes that cause the changes shown by arrows A,B, C and D.
(b)Name one physical factor which affects process C.
(c) Give two uses of process C to animals.
(d) (i) State one human activity which tends to lower the level of carbon dioxide in the atmosphere.
(ii) Explain how the activity suggested in d (i) above lowers the level of carbon dioxide in the atmosphere.

15. The figure below shows a kidney and the tubes connected to it.

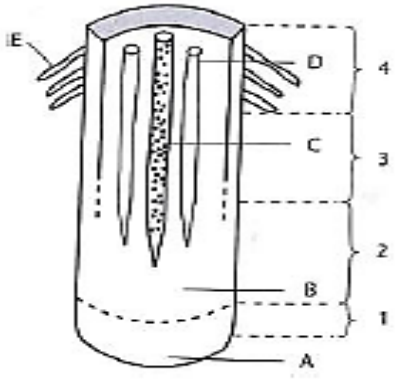


(a) Name the
(i) tubes labelled **P**, **Q** and **M**. **(3 mark)**
(ii) liquid carried by tube M. **(1/2 mark)**
(iii) structure to which tube M is joined? **(1/2 mark)**
(b) Give two differences between P and Q in the following;
(i) structure. **(2 marks)**
(ii) functioning. **(2 marks)**
(iii) composition. **(2 marks)**

16. Excess proteins are broken down in the body. The waste nitrogen compounds produced from these proteins are excreted.

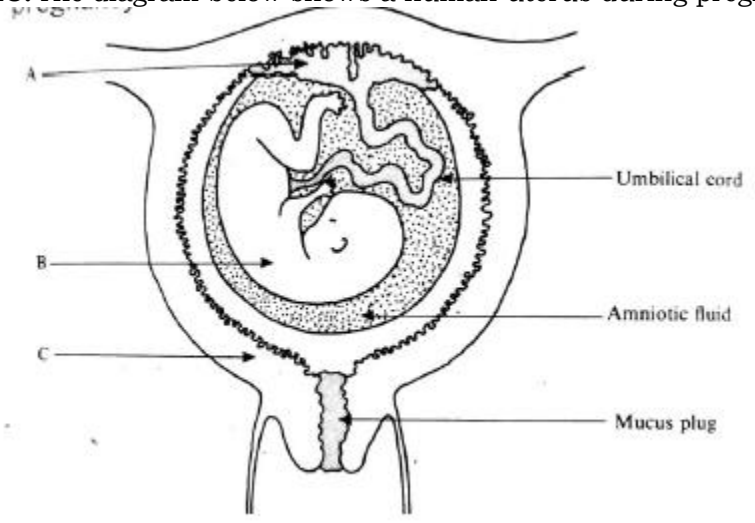
(a) State where the nitrogen waste compounds are produced from. **(1 mark)**
(b) Describe how the waste nitrogen compounds are;
(i) produced. **(2 marks)**
(ii) transported. **(1 marks)**
(iii) excreted. **(6 marks)**

17. The figure below shows a longitudinal section of a dicotyledonous root tip.



(a) (i) Label the parts A to E. **(2½ marks)**
(ii) State the function of the part labelled A to E. **(2½ marks)**
(b) (i) Label zones 2 to 4. **(1½ marks)**
(ii) Draw and label a transverse section of zone 4. **(3½marks)**

18. The diagram below shows a human uterus during pregnancy.



(i) Name the parts labelled A, B and C. **(3marks)**

(ii) Give one function for each of the following: amniotic fluid, umbilical cord. **(2 marks)**

(iii) Name two substances that pass from the mother's blood to the blood of the fetus. **(2 marks)**

(iv) Use the diagram to suggest three changes that will occur before the birth of a fetus. **(3 marks)**

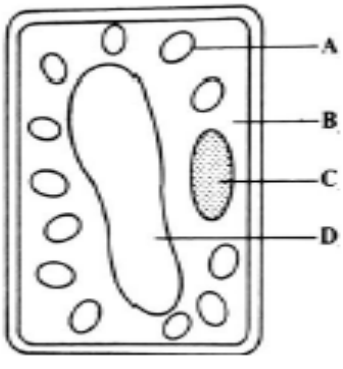
19. (a) What is a recessive gene? **(2 marks)**

(b) The gene for light skin is recessive to dark skin. When a bleached woman married a light skinned man all their children were dark skinned.

(i) Explain why all the children were dark skinned. **(2 marks)**

(ii) With symbols, present across for the parents above. **(6 marks)**

20. The diagram below shows a specialized plant cell.



(a) Name

(i) the specialized plant cell. **(1 mark)**

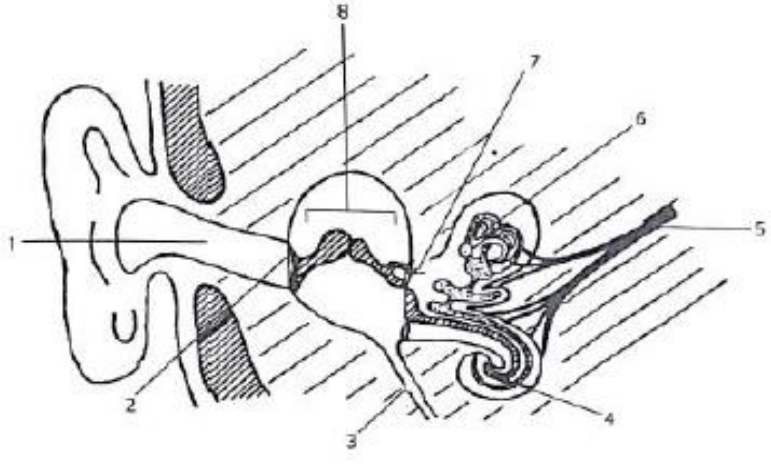
(ii) the parts labelled A, B, C and D. **(2 marks)**

(b) (i) Which two of the structures labelled A, B, C and D would you not find in a human cheek cell.? **(1 mark)**

(iii) What is the function of part A? **(1 mark)**

(c) Describe an investigation you could carry out to find out if a leaf contains starch. **(5 marks)**

21. The figure below shows the structure of a human ear.



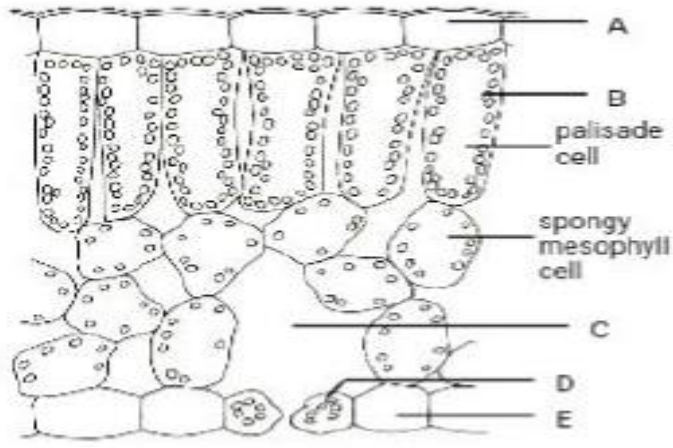
(a) Name the parts labelled 1 to 8. **(4 marks)**

(b) State the function of parts labelled 2,3,4,5 and 6 **(5 marks)**

(c) What happens to part 2 when part 3 is blocked? **(1 mark)**

7

22. The drawing below represents a vertical section through a leaf.



(a). Name parts labeled A to E
(b) Outline the differences between the
(i) Palisade and spongy mesophyll cells.
(ii) A and D
(c) How the cells of the following parts adapted to perform their functions.
(i) Mesophyll
(ii) A
(d) From the figure, state three adaptations of a leaf for uptake of carbon dioxide for photosynthesis.

23. In a certain ecosystem, hawks feed on snakes, toads and chicken. The snakes feed on toads, lizards and chicken while these feed on worms, termites and grasshoppers. The worms, termites and grass hoppers feed on green plants.
(a) (i) Construct a food web to show the feeding relationship between all the organisms in this ecosystem. **(04 marks)**
(ii) Construct a food chain to show the feeding relationship between snakes, worms, toads, hawks and green plants. **(01 mark)**
(iii) From the food chain in (a) (ii) above, construct a pyramid of energy to represent the feeding relationship. **(2½ marks)**
(b) (i) What trophic levels do the following organisms occupy in this ecosystem? **(1½ marks)**
Chicken
Termites
Green plants
(ii) Why are trophic levels in a food chain normally not more than five? **(01 mark)**

SECTION C: ESSAY QUESTIONS

24. (a) (i) Explain what is meant by a tissue. **(2 marks)**
(ii) Why is human blood regarded as a tissue. **(6 marks)**
(b) Organs are made of tissues which perform certain specialized functions. Describe and explain how this statement is true for each of the following organs:
(i) the leaf of a flowering plant. (ii) the human eye. **(7 marks)**

25. Both photosynthesis and respiration occur in green plants. Compare these two processes using the following;
(a) Raw materials, products, energy conversions. **(10 marks)**
(b) The main function of each process. **(1 mark)**
(c) Factors which affect the rate of each process. **(4 marks)**

26. (a) Give three primary functions of leaves of a flowering plant. **(3 marks)**
(b) Explain how the structure and position of leaves relate to the main function of leaves to the flowering plant. **(12 marks)**

27. a) What is excretion? **(2 marks)**
(b) Using named examples of excretory products, explain the importance of excretion. **(7 marks)**
(c) State the role of the following parts of the human nephron: **(6 marks)**
i) Glomerulus
ii) Bowman's capsule
iii) Proximal convoluted tubule

28. Describe the processes involved in the movement of water through a plant as it passes from the soil to the air. **(15 marks)**

29. (a) Explain how you get fresh air into your lungs. **(9 marks)**
(b) How does oxygen in the air in the alveolus reach the heart? **(6 marks)**

30. (a) Describe how man can hear a gunshot. **(12 marks)**
(b) How is the human eye lens adapted to its functions? **(3 marks)**

31. (a) Explain how gut organs are adapted to digestion and absorption of the main food value of cooked cassava. **(12 marks)**
(b) Explain how temperature affects enzyme activity. **(3 marks)**
32. (a) Define the term dispersal as used to fruits and seeds. **(1 mark)**
(b) State any four importance of fruit and seed dispersal. **(4 marks)**
(c) Giving at least two examples, state any four adaptations of fruits and seeds dispersed by wind. **(7 marks)**
(d) Describe the mode of dispersal of a Guava fruit **(4 marks)**
33. Describe man's activities that lead to pollution of water bodies. **(15 marks)**
34. (a) What is accommodation? **(02marks)**
(b) Suppose a boy was sitting in a dimly lit room reading a book, then he suddenly stepped out of the room into bright sunshine to look at an aeroplane in the sky Describe the sequence of events which would occur in his eyes to enable him see the aeroplane clearly: **(09 marks)**
(c) Explain why many old people use glasses to read. **(04 marks)**
35. (a) Define the term metamorphosis. **(1 mark)**
(b) Describe the life cycle of an anopheles mosquito. **(10 marks)**
(c) State the measures that can be taken to control the spread of mosquito-transmitted diseases.
36. (a) Draw a labeled diagram to show the internal structure of an organ for absorption in the small intestines. **(5 marks)**
(b) Describe how the organ is suited for its function. **(4 marks)**
(c) Explain what happens to the end products of digestion when they leave the small intestine.
37. With the help of a diagram, describe the sequence of events that lead to sudden releasing of a hot frying pan from the hand. **(15 marks)**
38. (a)Explain the importance of earthworms in improving soil fertility. **(6 marks)**
(b) Describe an experiment to determine the percentage of air in a soil sample. (9 marks)
39. (a) What do you understand by the term gland? **(1 marks)**
(b) A wrestler faces a very aggressive opponent in a hotly contested fight. Explain the physiological changes that occur in his body to prepare him for the fight. **(10 marks)**
(c) Outline four ways the effects produced by hormones differ from withdrawal of a hand from a switch due to electric shock. **(4 marks)**
40. (a) (i) Define the term locomotion.
(ii) Outline the importance of Locomotion
(b) Explain how the following organisms are adopted to their mode of locomotion
i. Fish ii. Birds
41. (a) Define the following terms as applied to genetics.
(i) Codominance. **(1 mark)**
(ii) complete dominance. **(1 mark)**
(iii) sex linked gene **(1 mark)**
(b) Haemophilia is a sex linked character caused by a recessive gene carried on the X-chromosome. A carrier woman marries a normal man. Using suitable genetics symbols;
(i) work out the genotypes and phenotypes of their children. **(7 marks)**
(ii) what is the probability of the couple getting a haemophiliac son? **(1 mark)**
(c) Both Haemophilia and colour blindness are sex-linked; explain why in any given population, there are more people with colour blindness than those with Haemophilia. **(2 marks** 9
(d) Give two modern applications of Genetics. **(2 marks)**
42. (a) Describe the processes in blood vessels which form a blood clot. **(05 marks)**
(b) Explain **three** major precautions that must be considered before a successful blood transfusion. **(07 marks)**
(c) Outline any three lines of defense against bacteria entering the blood system. **(03 marks)**
43. (a) Compare monocotyledons and dicotyledons, using **structural** features. **(9 marks)**
(b) Giving an example in each case, describe two modifications of each of the following for carrying out secondary functions. **(6 marks)** (i) Leaves (ii) Stems (iii) Roots. **(6marks)**

O LEVEL BIOLOGY INTERNAL SEMINAR TO BE HELD ON SUNDAY 12TH JUNE 2022

PROGRAMME LINE UP
DATE: SUNDAY, 12TH JUNE, 2022
ACTIVITY TIME

1. Arrival and settling of participants in their seats 7:30 am to 8:00 am
2. Opening Prayer, Welcome remarks and Briefing 8:00am to 8:05 am.

Session I

3. Students presentations 8:05am to 1:00pm
4. Concluding remarks for session I 1:00pm to 1:15 pm
5. Lunch break 1: 15pm to 2:15pm

Session II

6. Students presentations 2:15pm to 3:15pm
7. Presentation by facilitators 3:15pm to 4:50pm
8. Closing remarks and closing prayer 4:50pm to 4:55pm
9. Departure 4:55pm to 4:59pm

Note:

- ✓ The students should rehearse presenting their question in **less than 10 minutes.**
- ✓ Schools that are supposed to discuss questions involving plotting should **plot** their graphs on **graph papers** and come with them to be scanned and projected.
- ✓ Those wishing to present using power point are encouraged.