

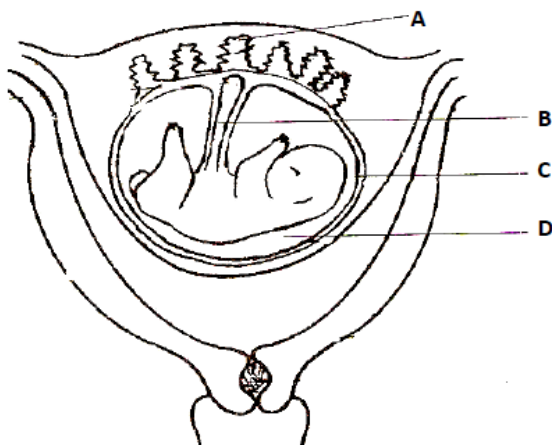
UMSSN SENIOR FOUR REVISION QUESTIONS 2020

1. An experiment was carried out to investigate transpiration and absorption of water in sunflower plants in their natural environment. The amount of water was measured at two-hour intervals. The results are as shown in the table below.

Time of day	Amount of water in grams	
	Absorption	Transpiration
11 00- 13 00	20	33
13 00- 15 00	30	45
15 00- 1700	42	52
17 00- 19 00	46	46
19 00- 21 00	32	25
21 00- 23 00	20	16
23 00- 01 00	15	08
01 00- 03 00	11	04

- (a) Using the same axes, plot a graph to show transpiration and absorption of water in grammes against time of day.
- (b) At what time of day was the amount of water the same for absorption and transpiration?
- (c) Account for the shape of each of the curve plotted on the graph.
- (d) Explain what would happen to transpiration and absorption of water if the experiment was continued till 05 00 hours.
- (e) i) Name two factors that could affect transpiration and absorption at a given time.
 (ii) Explain how the two factors stated in (e) (i) above affect transpiration

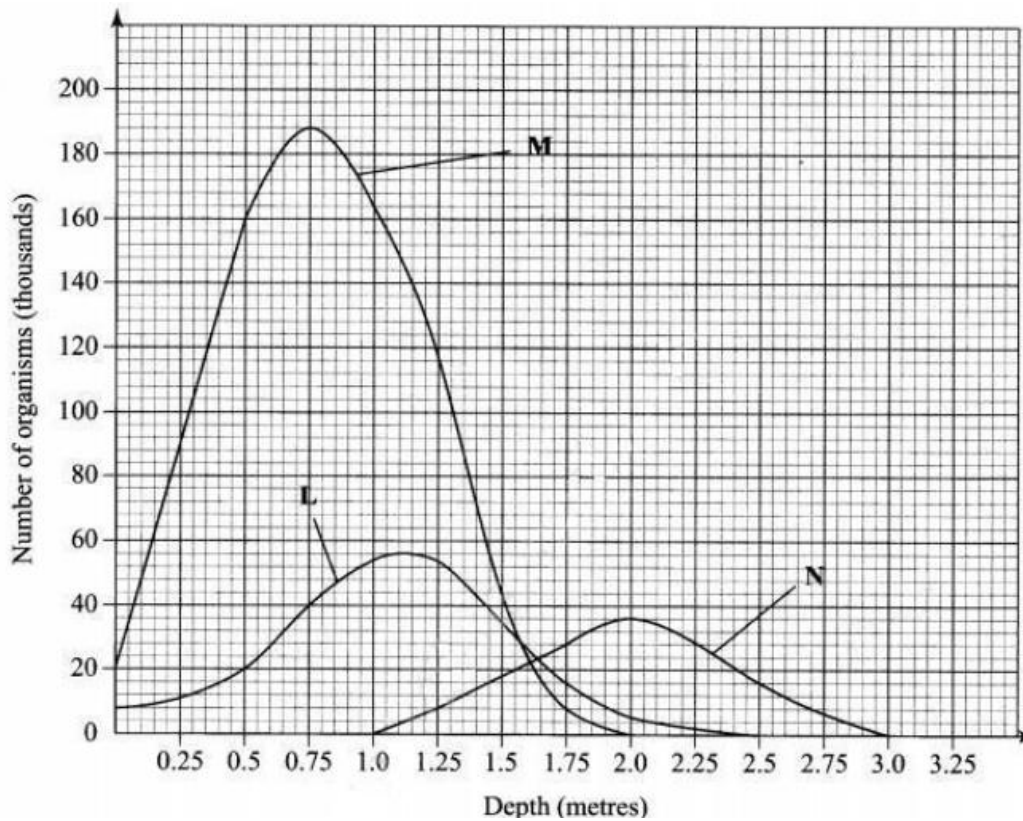
2. The diagram below represents a human foetus in the uterus.



- (a) Name each of the labeled parts A to D.
- (b) Name the types of blood vessels found in the structures labeled B giving their functions.
- (c) Give the features that enable the structure labeled A carry out its functions.
- (d) Give reasons why fetal blood should not mix with maternal blood.

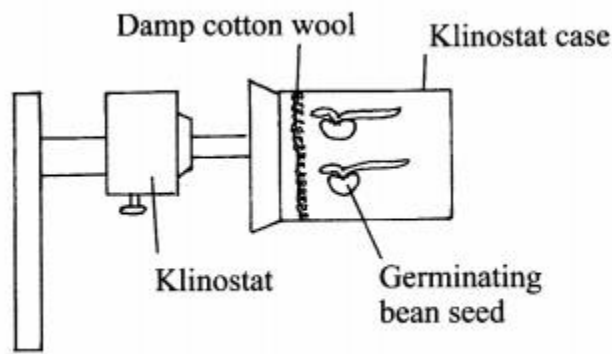
3. (a) How does excretion take place in plants?
- (b) Describe the role of the human skin in homeostasis.
- (c) Explain why the domestic rat requires more energy per unit body weight than an elephant.

4. The graph below shows the relative numbers of three main species of organisms in a pond.



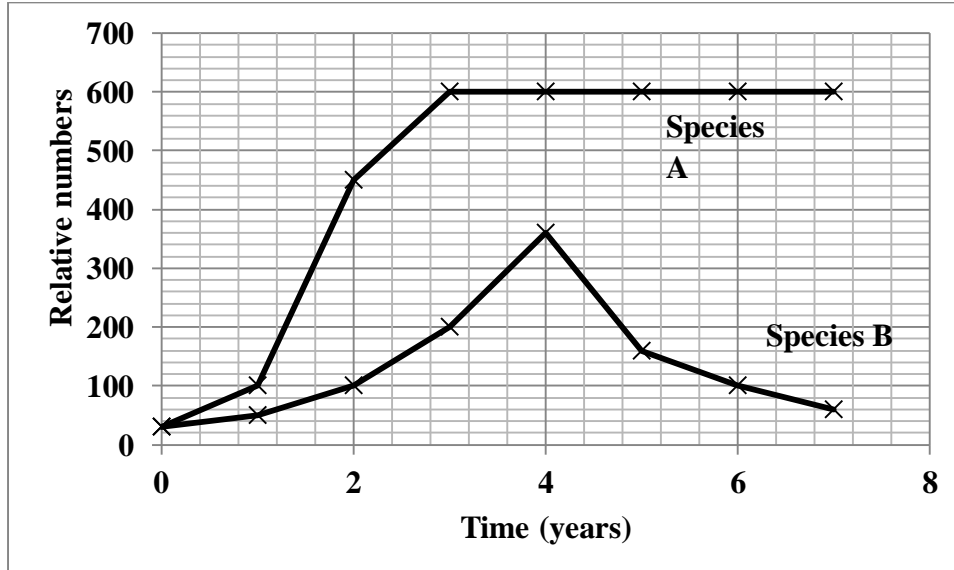
- (a) Giving reason for each of your answer, which of the species is a
 (i) producer? (ii) secondary consumer?
- (b) State the depths at which each of the populations labelled L, M and N is at its optimum.
- (c) (i) Which method may have been used to determine the population of organisms labelled N in the pond?
 (ii) Give a reason for your answer in (c) (i) above.
 (iii) State the assumptions made when using the method in (c) (i) above.
- (d) State reasons why primary productivity in the pond decreases with depth.
- (e) Explain the ecological importance of fungi to plants.
- (f) Why is flooding likely to lead to a cholera outbreak?

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



- (a) Name the type of response that was being investigated.
- (b) If the Klinostat was not rotating:
- state the observations that would be made on the seedlings after three days;
 - explain the observations in (b) (i) above,
- (c) If the experiment was repeated with the Klinostat rotating:
- state the observation that was made on the seedlings after three days.
 - give reason for the observation made on the seedlings.
- (d) What is the importance of the response being investigated to plants?

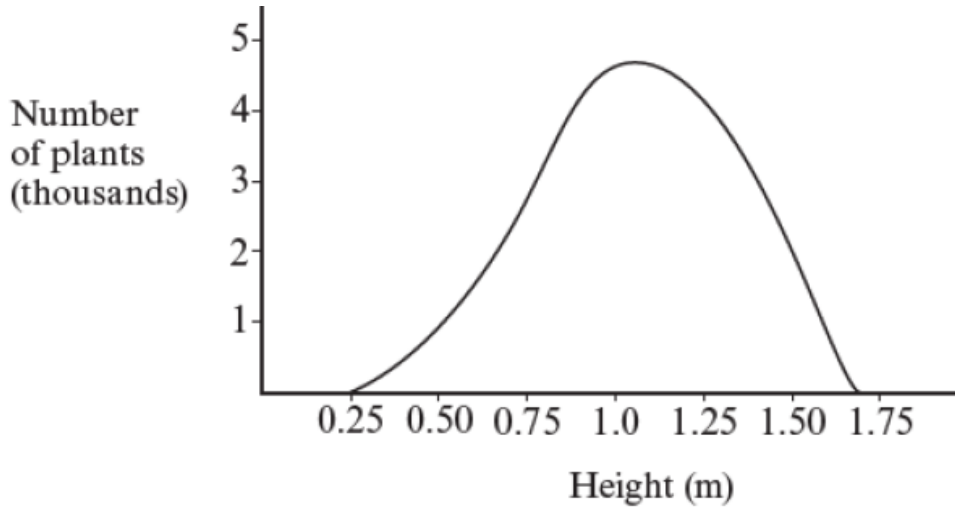
6. Two herbivore mammalian species were introduced into an ecosystem at the same time and in equal numbers. The graph below represents their populations during the first seven years. Study the graph and answer the questions that follow:



- (a) Describe the shape of the curve for species B.
- (b) (i) Which species has better competition ability? Give a reason for your answer in (b) (i) above.
- (c) Account for the shape of the curve of species A between:
- one year and three years.
 - three years and seven years.

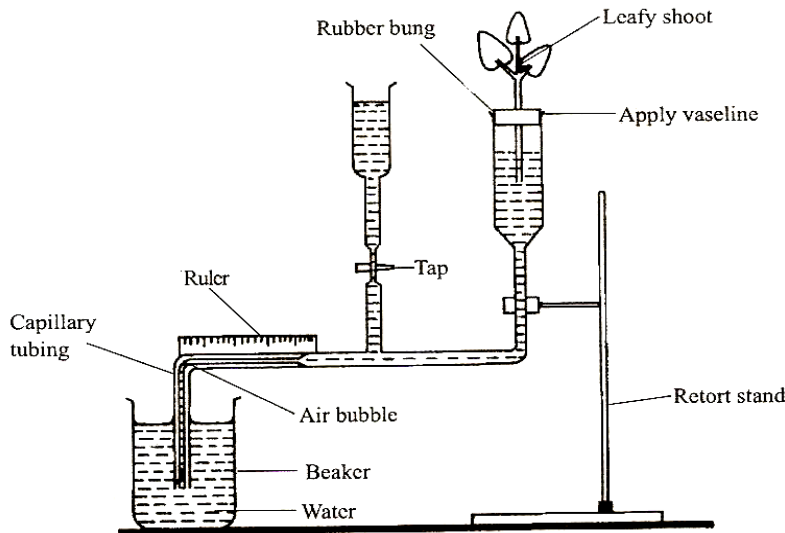
- (d) Name the type of interaction that exists between the two species of herbivores in the ecosystem.
- (e) Why is it that gazelles and buffaloes do occupy same ecosystem?

7. The graph below shows the variation in height of wheat plants.



- (a) State the name given to the curve.
- (b) What type of variation is shown by the graph? Give reasons for your answer.
- (c) State the differences between the inheritance of height in wheat plants illustrated by the curve above and inheritance of albinism in humans.
- (d) Colour blindness is a sex-linked character in human beings. A carrier woman got married to a colour-blind man.
- (i) Using suitable genetic symbols; work out the possible phenotypic ratio of their offspring.
- (ii) Explain why sex-linked characters are more common in males than females.
8. (a) What are hormones?
- (b) Differentiate between an endocrine and exocrine gland.
- (c) What hormonal deficiency causes a type of mental deficiency in children? How can this be curbed?
- (d) What happens to hormones that are no longer needed?
- (e) The pituitary gland is sometimes called the 'master gland' Explain why is it so.
- (f) State the functions of the following hormones in an adult person; adrenaline, testosterone, thyroxin.
- (g) Compare Nervous and endocrine system.

9. Below is a set up that was used to investigate a certain process in plants



- (a) What does the instrument measure; (i) directly? (ii) indirectly?
- (b) Give reasons for your answer in (a) (ii) above.
- (c) (i) Give two precautions that should be taken when preparing the experiment.
 (ii) State a reason for each precautions stated in b (i) above
- (d) List three structural factors that affect the process under investigation.
- (e) Outline the importance of the process being investigated to plants.

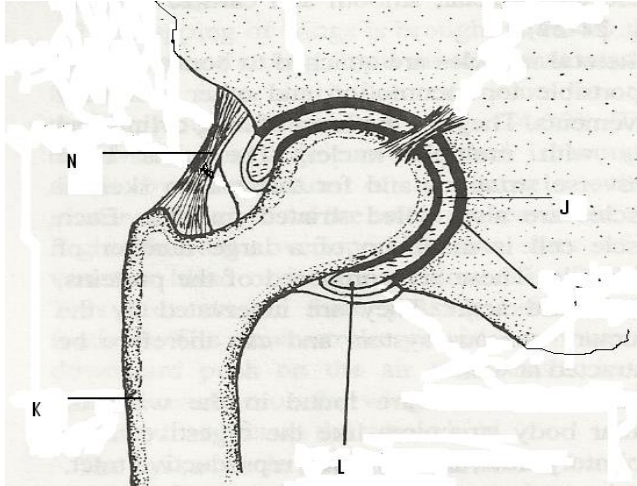
10. During germination and growth of cereal, dry weight of endosperm, embryo and total dry weight were determined at 2 days intervals and results recorded as shown below.

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

- (a) Using same axes, draw graphs of dry weight of endosperm, embryo and total dry weight against time.
- (b) How are the changes in dry weight of endosperm and embryo;
- (i) Similar? (ii) different?
- (c) Account for the:
- (i) Decrease in dry weight of endosperm from day 0 to 10.
- (ii) Increase in dry weight of embryo from day 0 to 10th day

- (iii) Decrease in total dry weight from day 0 to 8. (iv) Increase in total dry weight after the 8th day
- (d) (i) State two factors within the seed and two outside the seed that causes dormancy.
- (ii) Outline ways of breaking seed dormancy.

11. The diagram below shows some of the features of a synovial joint. Study the diagram carefully and answer the questions that follow.



- (a) Name the type of synovial joint.
- (b) Name each of the parts labelled on the diagram.
- (c) State two roles of the part labeled L.
- (d) Suggest one advantage of this type of joint.

12. (a) (i) Define the term blood.

(ii) Distinguish between an artery and a vein.

(b) (i) State three structural differences between an artery and a vein of a mammal.

(ii) How are the capillary suited to their function?

(c) (i) What is blood transfusion?

(ii) Complete the table below about blood transfusion in Man.

Blood group Type	Donates blood to	Receives Blood from
A		A, 0
B		
AB	AB	
SO		

(iii) A person whose blood group is A died shortly after receiving blood from a person of blood group B.

Explain the cause of death.

(d) Explain reason for each of the following blood groups;

(i) Blood group O person is a universal donor

(ii) Blood group AB person is a universal recipient

(iii) Outline the factors considered before transfusing blood.

13. Catalase is an enzyme present in all living tissues in both plants and animals. It breaks down hydrogen peroxide produced during cellular metabolism evidenced by effervescence. In an experiment 10 ml of hydrogen peroxide was put in different boiling tubes into which different specimens were put. The table below summarizes part of the results. Carefully analyze it and answer the questions that follow.

Test tube	The specimen	Observation
A	Fresh liver	A lot of bubbling almost violent
B	Boiled liver	No bubbling
C	Fresh muscle tissue	Vigorous bubbling less than tube A
D	Dry bean seed	Very slow bubbling
E	Soaked bean seed	Vigorous bubbling same intensity of tube C
F	1 cm ³ potato cube	Moderate bubbling
G	1 cm ³ mashed potato	Vigorous bubbling same intensity as in tube E

(a) Compare & account for the rate of bubbling between

(i) Tube A and tube B.

(iii) Tube D and tube E

(ii) Tube A and C

(iv) Tube F and G

(b) Write the equation for the reaction that produces the bubbling.

(c) Suggest why hydrogen peroxide should not accumulate in living cells.

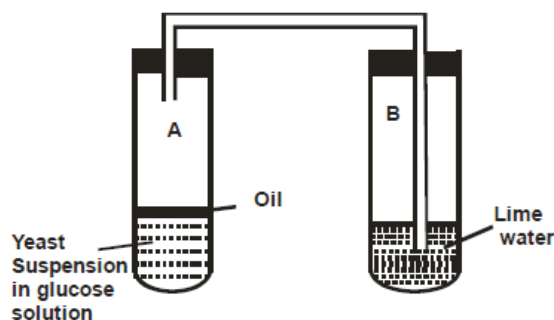
14. An experiment was done to determine the uptake of nitrogen from the soil by broad bean seedlings. The experiment was done with one set of seedlings M grown in the atmosphere enriched with carbon dioxide and another set up of seedlings N grown in the normal atmosphere.

The amount of nitrogen in each seedling was measured in milligrams at intervals often days. The table below shows the results obtained.

	Amount of Nitrogen in Milligrams									
SET M	0	25	70	125	160	395	635	860	895	915
SET N	0	15	35	50	65	105	120	125	135	140
TIME(DAYS)	15	25	35	45	55	65	75	85	95	105

- (a) Using the same axis draw graph of nitrogen uptake by the two (M and N) sets of broad bean seedlings against time.
- (b) Using the graph drawn, state how the change in amount of nitrogen in set M and N is;
- (i) Similar. (ii) Different
- (c) Determine the rate of uptake of nitrogen in Set **M** between 65 and 85 days.
- (d) (i) What is the relationship between carbon dioxide concentration in the air and nitrogen uptake?
(ii) Account for the relationship in (c)(i) above.
- (e) (i) What would happen to the concentration of nitrogen in the seedlings in set M, if after 75 days the seedlings are transferred to a normal atmosphere.
(ii) Explain your answer in (e) (i) above.
- (f) State **three** ways in which nitrogen fixation occurs.

15. The diagram below illustrate an experiment used to demonstrate a certain biological process. Before adding yeast suspension the glucose solution was first boiled and then cooled.



- (a) What process is being demonstrated?
- (b) Why was glucose solution boiled and then cooled before adding yeast?
- (c) What is the role of adding an oil layer?
- (c) Explain what was observed after sometime.
- (d) Write a word equation to summarize the reactions taking place in tube A.
- (e) Suggest the control set up for the above experiment.

16. In an experiment, a man drank one litre of water and the volume of urine produced was measured and recorded at an interval of one hour after drinking the water. On the second day, the man repeated the experiment but this time he drank one litre of 0.9% sodium chloride solution. The results are as shown in the table below:

Time (hours)	Volume of urine produced (cm ³) on drinking	
	Water	0.9 % sodium chloride solution
0	80	30
1	50	30
2	350	40
3	540	35
4	300	60
5	100	40
6	50	80
7	70	100

(a) On the same axes, plot graphs of urine produced on drinking water and 0.9 % sodium chloride solution against time.

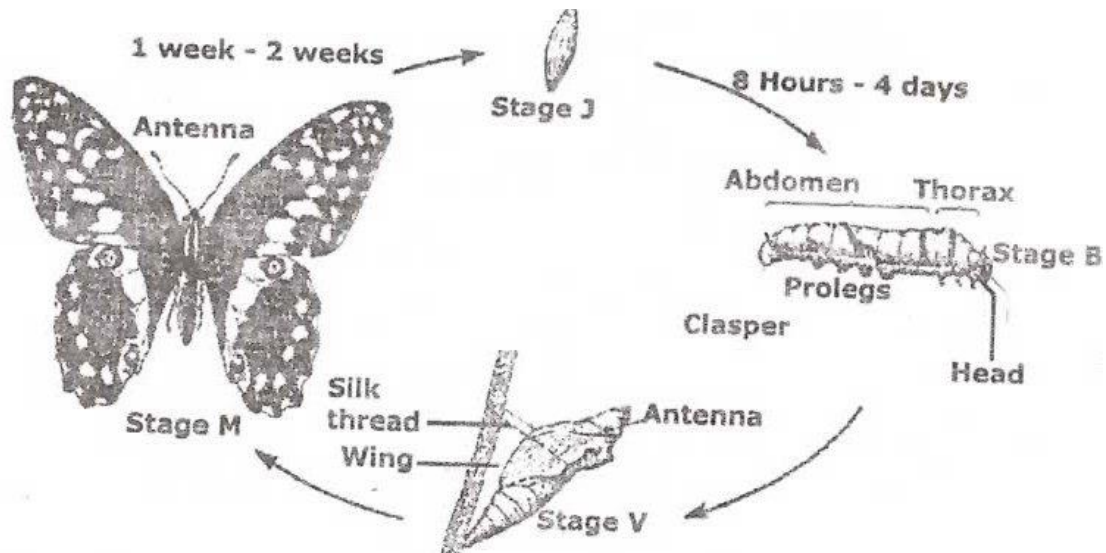
(b) From the graph, determine the volume of urine produced by the man two and a half hours after drinking water.

(c) Explain the production of urine produced by the man when he drank the litre of 0.9 % sodium chloride solution.

(d) What is meant by diabetes insipidus?

(e) Explain why treatment of diabetes mellitus is via injection and not through taking insulin tablets orally.

17. The diagram below shows the life cycle of a butterfly.



(a) (i) Name the type of life cycle shown above. Give a reason for your answer.

(ii) Suggest the importance of such type of life cycle.

(b) Using letter symbols list the various stages in the sequence they occur.

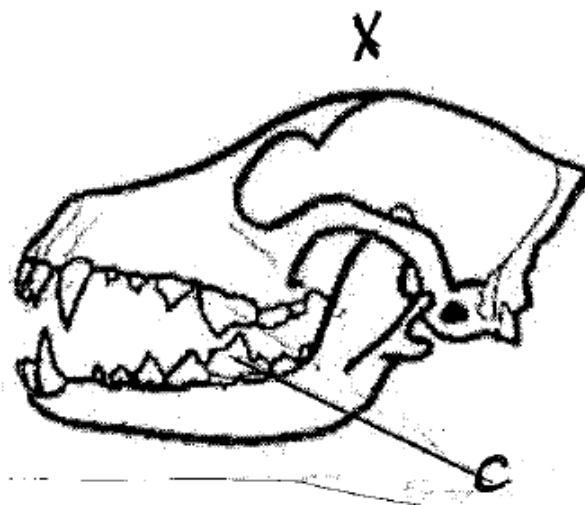
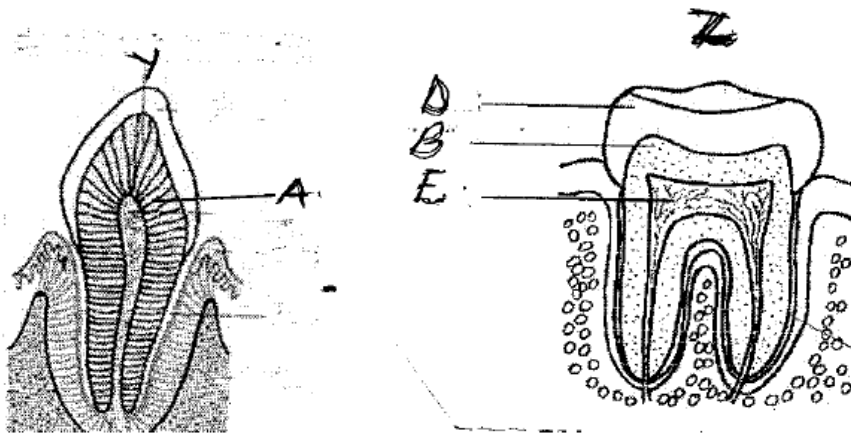
(c) Of the stages labelled name. (i) The resting stage

(ii) The feeding stage

(d) What is the importance of stage B and V.

(e) How is stage B adapted for its survival.

18. You are provided with diagrams of specimens taken from a mammal. Study them carefully and answer the questions that follow.



- (a) Identify each of the diagrams labeled X, Y and Z.
- (b) State the diet of the animal from which diagram X was taken and give a reason for your answer
- (c) Name the parts labeled A, B, and D.
- (d) How are the structures D and C adapted to their functions?
- (e) State the function of the parts labeled.

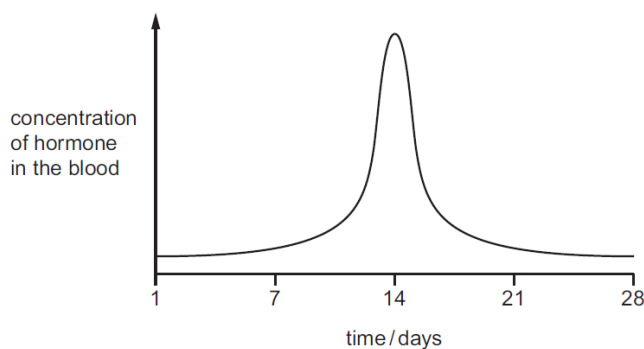
(f) State the differences between Y and Z.

(g) A skull found to have the dental formula show below.

$$i \frac{0}{3} \quad c \frac{0}{1} \quad pm \frac{3}{3} \quad m \frac{3}{3}$$

- i) Calculate the total number of teeth of the organism above.
- ii) Identify the mode of nutrition of the organism. Give a reason for your answer.

19. The graph shows the concentration of a hormone in the blood during one menstrual cycle in man.



- a) What is meant by menstruation?
- b) Identify the hormone indicated by the graph. Give reason for your answer.
- c) Describe the variation in level of hormone over the 28-day period.

d) State the series of events in human female that eventually led to rise in the hormone concentration on day 14.

e) Outline the effects of the hormone identified in (b) above during the cycle.

20. In an investigation; the approximate composition of plasma, glomerular filtrate and urine of a mammal was determined. The results obtained are shown in the table.

Component	Plasma g/100cm ³	Glomerular g/100cm ³	Urine g/100cm ³
Urea	0.04	0.04	2.10
Uric acid	0.05	0.05	0.70
Glucose	0.20	0.20	0.00
Amino acids	0.07	0.07	0.00
Plasma proteins	9.00	0.00	0.00
Salts	0.84	0.84	1.96

(a) Account for the absence of;

(i) plasma proteins in glomerular filtrate

(ii) Glucose and amino acids in urine.

(b) From the above results, state;

(i) two types of wastes eliminated from mammalian blood.

(ii) two functions of the kidney

(c) Under what circumstances may each of the following appear in urine?

(i) Glucose

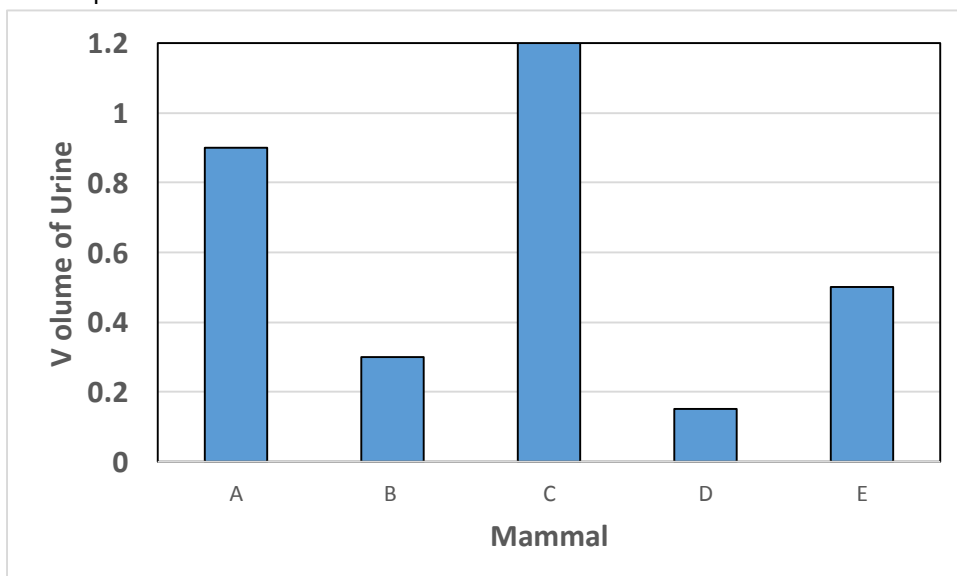
(ii) Plasma proteins

(d) (i) State the principal requirement of filtration that forms glomerular filtrate.

(ii) How is the above requirement stated in (d) (i) above achieved in the kidney?

(e) Describe the process of urea formation.

(f) Quantity of urine passed out per day was established in five mammals A, B, C, D, and E of the same species in their natural habitats. The results are shown below.



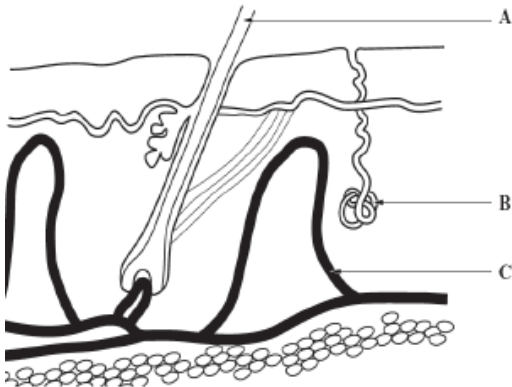
(i) Which of the five mammals is most likely to be excreting urine rich in ammonia? Give reasons.

(ii) Which of the mammals was more likely to be living in a desert? Give reason.

(iii) State two structural differences expected in the nephrons of Mammal A and D.

(iv) Explain how antidiuretic hormone affects the amount of urine produced by a mammal per day.

21. (a) Study the figure below shows part of the human skin study it and answer the questions that follow

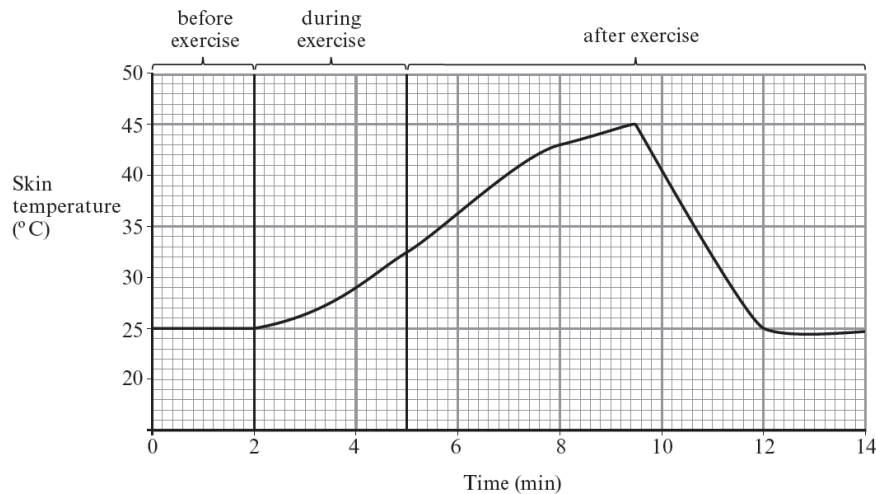


(i) Label parts A to C.

(ii) From the figure, state how the skin is adapted to temperature regulation.

(iii) Explain how the variation in diameter of blood vessel C rids the body of excess heat.

(b) The skin temperature of a squirrel was measured before, during and after exercise. The results are shown on the graph.



(i) Explain the variation in skin temperature during the course of the experiment.

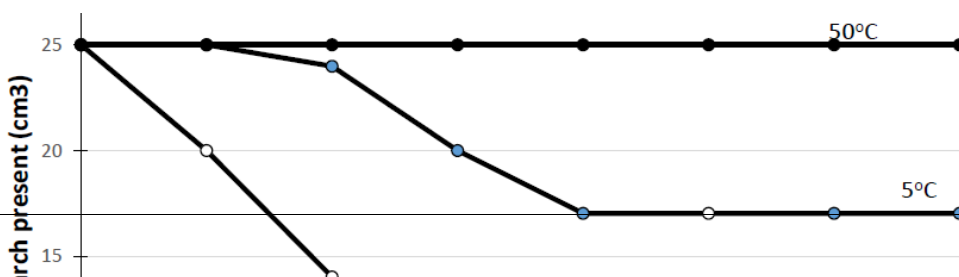
(ii) Describe how information about the rise in skin temperature reaches the brain.

(c) Explain each of the following observations.

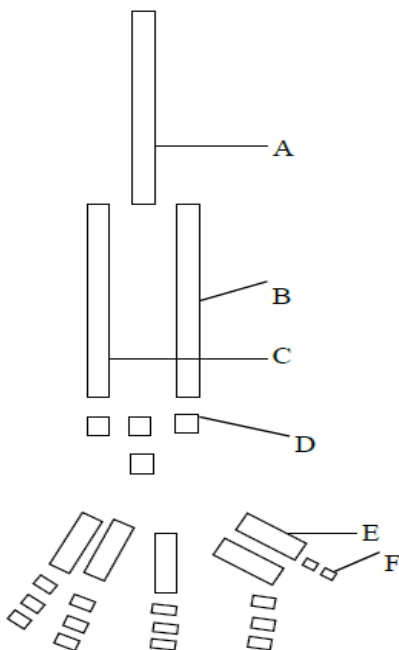
(i) It's never advisable for athlete to suddenly stop but rather to slow down.

(ii) Immediately after the exercise the breathing and heart rate remain high.

22. S4 students performed an experiment to find out the effect of saliva incubated at different temperatures of 5°C; 35°C and 50°C on starch. 5cm³ of saliva was added to 25cm³ of starch solution. Drops were withdrawn from the test tubes at 2 minutes intervals and amount of starch was tested. The graph below shows a plot of the results that were obtained.



- (a) (i) Describe the shape of each of the three curves. (ii) Explain each of the curves above.
- (b) (i) What was the effect of saliva on the starch.
(ii) Which of the above temperatures is suitable for the action of ptyalin? Give a reason.
(iii) What was the role of incubation?
- (c) Another student tested the contents of the tube using Benedict's solution. Explain what will be observed at;
(i) time 0 (ii) time 14 for 5°C; 35°C and 50°C respectively.
- (d) State four other factors limiting the action of saliva on starch apart from temperature.



23. The figure aside is a representation of part of a skeletal system.

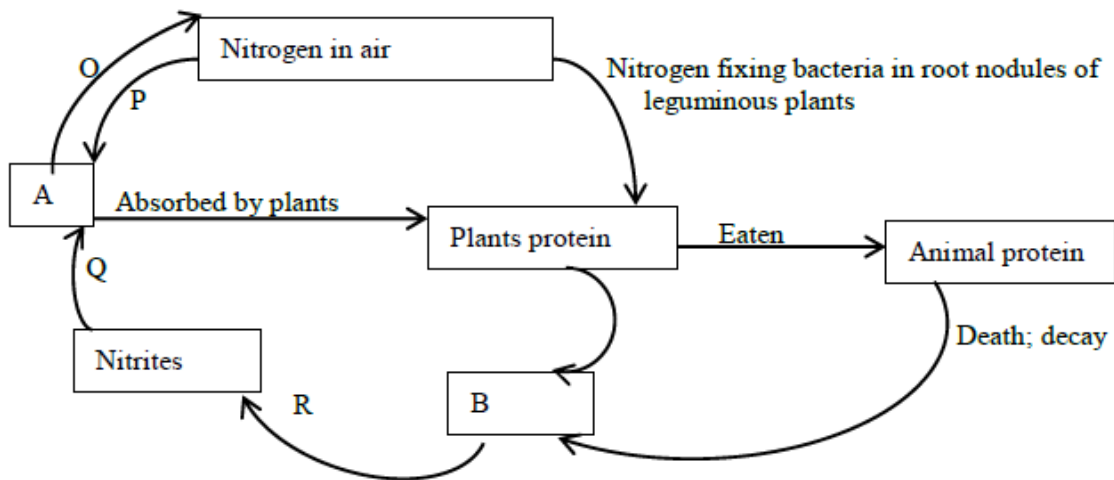
- (a) (i) Identify the diagram.
(ii) Name each of the parts labelled A to F.
(iii) Name the joint formed between parts A and B; and between the parts labeled F
- (b) Differentiate between each of the following pairs.
(i) Axial skeleton and appendicular skeleton
(ii) bone and cartilage
(iii) Lumbar vertebrae and thoracic vertebrae

living organisms.

23. (a) Describe an experiment to show that soil contains

(b) Explain the value of earthworms in maintaining a condition suitable for crop growing.

24. The following is a diagram summarising the Nitrogen cycle.



(a) (i) Fill in the boxes A and B.

(ii) Name the bacteria responsible for processes O, P, Q and R.

(b) List four different ways in which nitrogen may be lost from the soil.

(c) Of what use is nitrogen to a plant?

(d) What are some of the symptoms of plants growing in nitrogen deficient soils?

(e) What do you understand by the following terms;

(i) Flocculation (ii) Leaching

(f) Explain why loam soil is considered the best soil for plant growth; as opposed to clay and sandy soil.

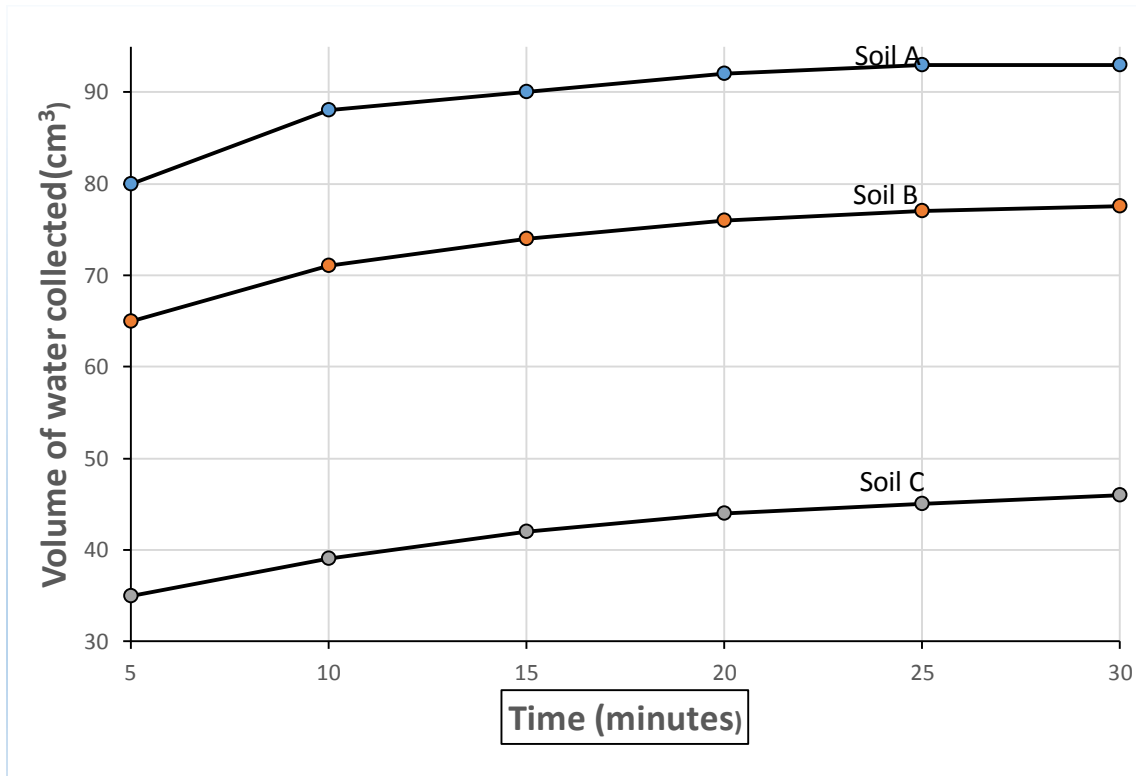
25. (a) Define photosynthesis. Use a symbolic equation to summarize the process.

b) Describe an experiment to show that carbon dioxide gas is necessary for photosynthesis.

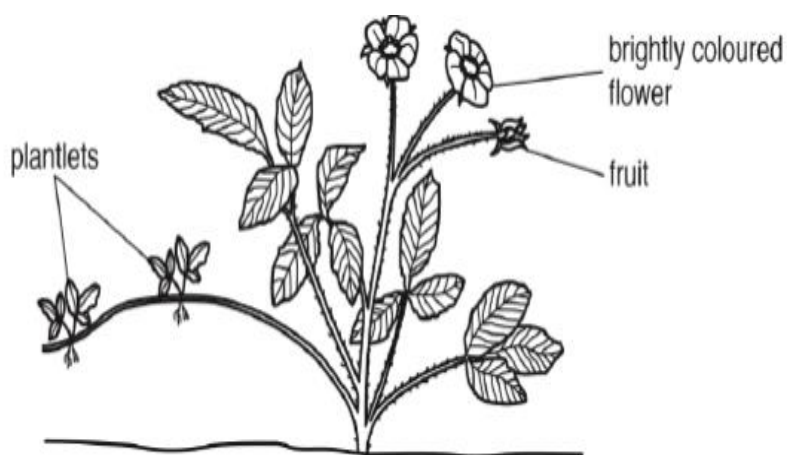
(c) Differentiate between photosynthesis and respiration.

(d) What is the significance of photosynthesis to living organisms?

26. Kiberu cut cylinders of potato tissue using a cork borer. He placed each cylinder into one of a range of sucrose solutions of different concentrations. He then left them for 2 hours, after which he removed each of them from the solutions. He recorded the length of each cylinder before and after immersion. The graph shows the results of this biology student's investigation.



- What was the aim of the experiment?
- Describe the trends of each of the curves on the graph.
- Explain the trends of each of the curves on the graph plotted.
- Which one of the three soil types is best for farming? Give reason for your answer.



30. The diagram shows the parts of a plant growing above ground.

(a) (i) State the type of reproduction that takes place using the flower shown in the diagram.

(ii) Describe the events that must take place for the flower to develop into a fruit.

(b) The plant may also reproduce

without using a flower, to produce new plants from plantlets. State the type of reproduction that produces the plantlets.

(c) Suggest the advantages to the plant of reproducing by each of the following methods:

(i) Using flowers.

(ii) Using plantlets.