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KCSE

PAPER 1

Biology

25 SERIES EXAMS

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SERIES 1

1. (i) Some herbaceous stems have very little strengthening tissue yet still remain upright. Explain. (2 marks)

.....

- (ii) Name the strengthening material in sclerenchyma (1 mark)

.....

2. State the functions of the following structures of the human brain. (3 marks)

- (i) Cerebrum

.....

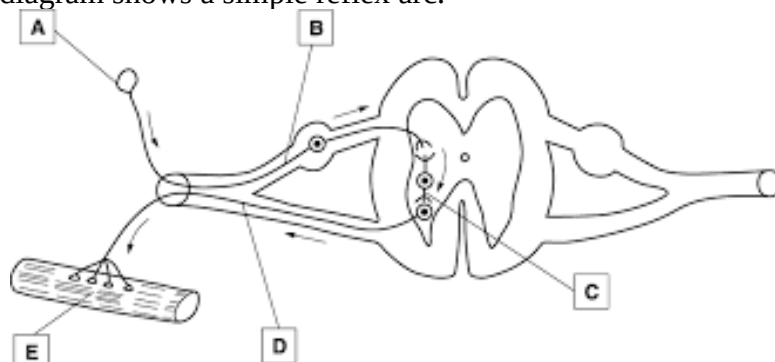
- (ii) Cerebellum

.....

- (iii) Medulla oblongata

.....

3. The diagram shows a simple reflex arc.

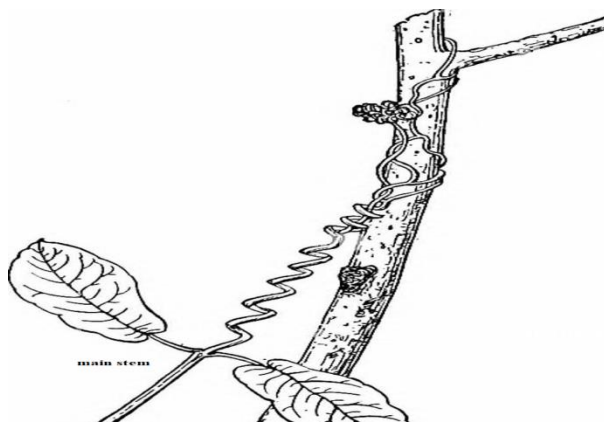


Explain how an impulse is transmitted across the gap between neurons C and D (3 marks)

.....

.....

4. (a) Based on the structure available on this diagram classify this type of stem. (1 mark)



- (b) How is the other type of stem different from this one? (1 mark)

.....

5. State the importance of tactic responses among some members of kingdom Protocista. (1 mark)

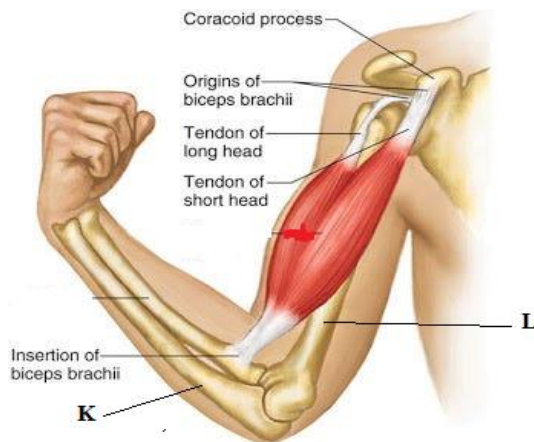
6. State two differences between tropisms and taxes. (2 marks)

	Tropisms	Taxes
(i)		
(ii)		

7. Explain continental drift as an evidence of evolution. (2 marks)

8. Why are some bacteria able to resist the effect of antibiotics? (2 marks)

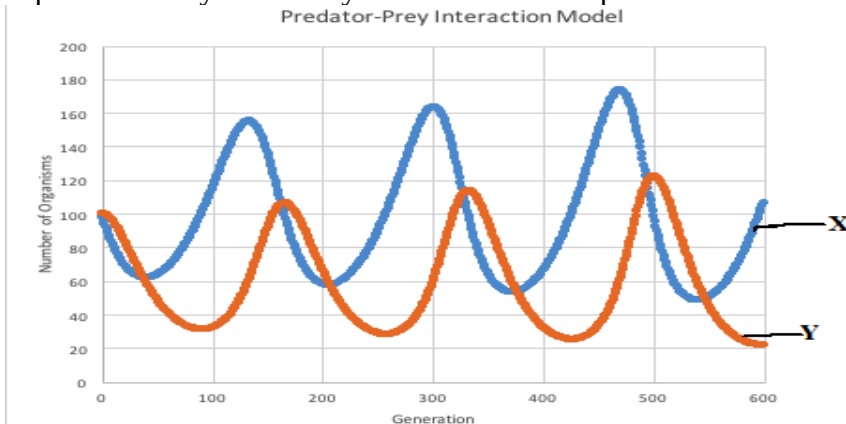
9. The diagram below illustrates the arrangement of bones and muscles in the human arm.



- (i) Name the bone labelled K (1 mark)
K
- (ii) Explain how the upward movement of the lower arms is brought about by the bones and muscles shown in the diagram above. (2 marks)
.....
.....
.....
10. Jerry's blood crystallizes at low oxygen concentration. He is married to Janice whose blood does not crystallize in low oxygen concentration. Work out the probability of the couple producing children with the same fate as their father Jerry. Use the letter d to denote for crystallization at low oxygen. (4 marks)
11. State the causative agents for the following diseases
- (i) Syphilis..... (1mark)

- (ii) Trichomoniasis (1mark)
 12. What do you understand by the term ecological niche? (1mark)

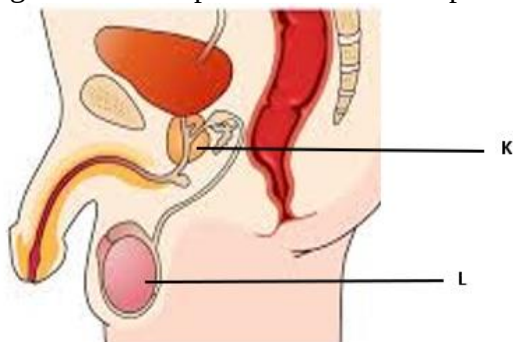
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 13. The diagram below shows the feeding relationship between rabbits and wolves in a given habitat over a period of 25 years. Study it and answer the questions that follow



- (i) Name the type of feeding relationship. (1mark)

 (ii) Which organism in the relationship above is represented by the curve labeled X and Y (2 marks)
 X
 Y

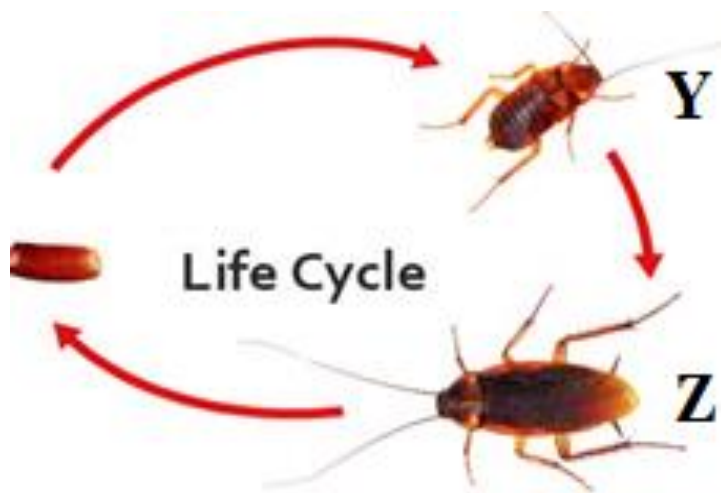
14. The diagram below represents a human reproductive organ.



- (i) State **two** adaptations of the structure labelled L to its functions. (2 marks)

 (ii) Explain the role of the role of the gland labelled K (1mark)

 15. The diagram below shows different developmental stages of a given organism.



- (a) Identify the stages represented by letter Y and Z (2 marks)
 Y
 Z
- (b) Identify the hormones which play a role in the above process and state where they are produced (2 marks)

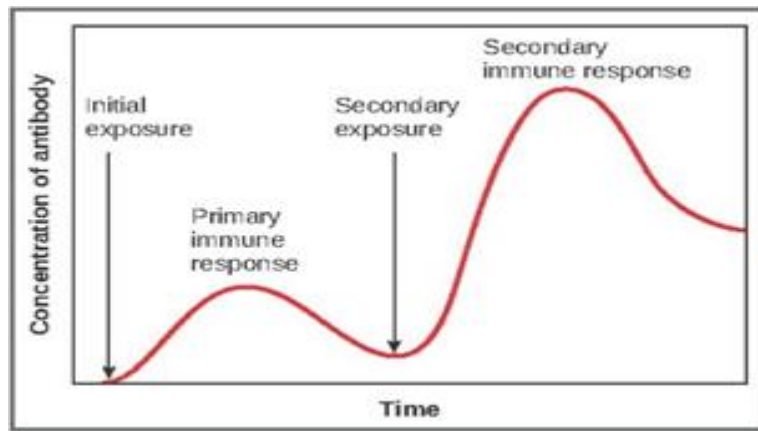
Hormone	Site of production

15. State the mode of asexual reproduction in yeast (1 mark)

16. Name **two** substances that leave the foetal blood through the placenta into maternal blood stream. (2 marks)

17. Besides venation, State **two** other external characteristics of leaves that can be used to classify plants. (2 marks)

18. The graph below shows the concentration antibodies produced during a primary infection and secondary infection against time. Study the graph and answer the question below.



(a) Name the type of immunity illustrated by the graph (1 mark)

(b) In a blood test a few drops of anti-B serum were added to two samples of blood separately. No agglutination occurred in either of them. What were the blood groups of the two samples (2 marks)

19. (a) State two ways in which opening of the stomata is important to plants (2 marks)

(b) Explain how accumulation of carbon (IV) oxide in a leaf affects the stomata (3 marks)

20. Explain each of the following observations:

(a) The stump of a severed tree trunk may exude copious quantities of fluids after cutting (1 mark)

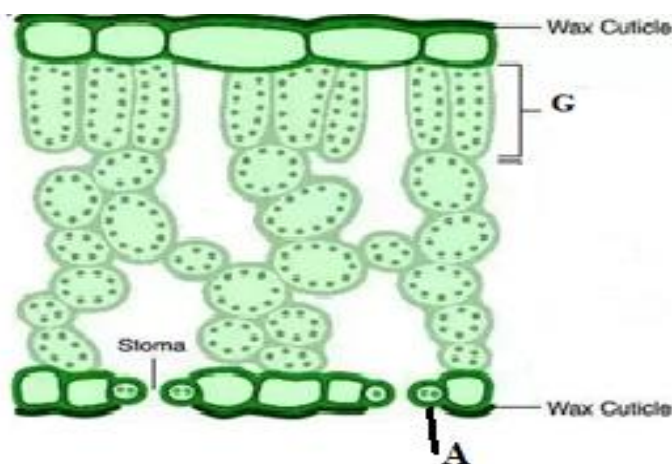
(b) Leaf fall reduces the rate of transpiration (1 mark)

(c) The xylem tissue is made up of dead tissue (1 mark)

21. (a) During the process of respiration, the breakdown of glucose occurs in phases. Explain why these phases are necessary? (2 marks)

(b) Explain why the rate of production of lactic acid increases during exercise (2 marks)

-
-
-
22. Explain why body temperature regulation is more difficult in a hot humid conditions (2 marks)
-
-
-
23. Suggest **two** ways in which plants compensate for lack of complex excretory organs (2 marks)
-
-
24. State **two** factors that would lead to a decrease in the rate of photosynthesis. (2 marks)
-
-
25. Knowledge and skills acquired in the course of studying biology are very important. Justify the above statement. (2 marks)
-
-
26. The ileum is highly coiled in mammals, State **two** biological significance of this feature? (2 marks)
-
-
-
27. Caecum is part of the digestive system of some herbivores. What is its role in digestion? (1 mark)
-
-
28. The diagram below is that of a certain plant tissue.



- a) Name the structures labeled G. (1 mark)
-
- b) State **two** adaptations of the specialized cell labeled A to its functions? (2 marks)

29. A student was viewing a slide prepared of an epidermal cell under medium power objective lens. The specimen appeared blurred. Which part of the microscope would the student adjust to obtain a clearer view? (1mark)
-
30. (i) Define active transport. (1 mark)
-
-
-
- (ii) Why are the following factors important in the process of active transport in cells:
- a) Oxygen (1 mark)
-
- b) Optimum temperature (1 mark)
-
-
31. (i) Suggest a likely habitat of an organism with an active contractile vacuole. (1 mark)
-
- (ii) Give a reason for your answer above. (1 mark)
-
-
32. How is dark stage of photosynthesis dependent on light stage? (2 marks)
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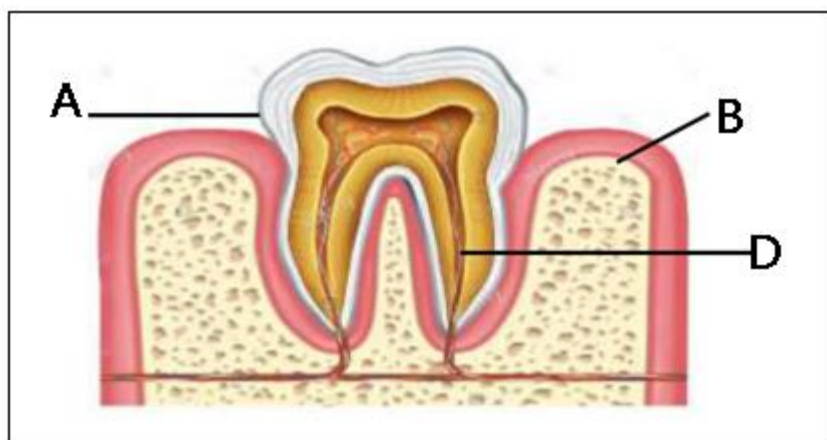
SERIES 2

1. How does growth as a characteristic of living organisms differ in plants and animals? **(2marks)**

2. (a) State **two** roles of active transport in animals **(2 mark)**

b) Cyanide lowers the rate of active transport. Explain? **(1mark)**

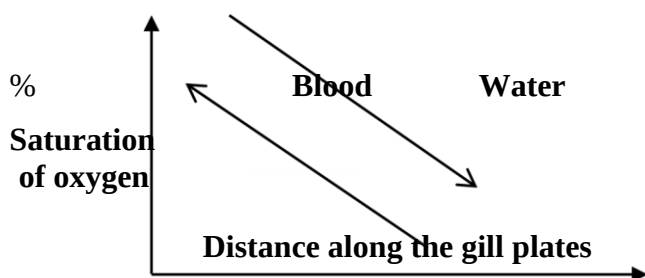
3. The figure below is a diagram of a vertical section of a mammalian tooth.



(i) Name the parts labelled **A** and **B**. **(2 marks)**

(ii) State **ONE** way in which structure **D** is adapted to its functions. **(1mark)**

4. The figure below shows % saturation of oxygen in blood in fish as water passes along the gill plate.

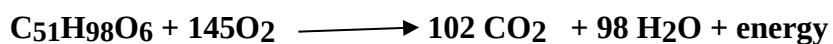


(a) (i) Name the type of blood flow shown in the gill plate. **(1mark)**

(ii) Explain the advantage of the type of flow named in a (i) above. **(2marks)**

(b) State organs in humans which display the type of flow named in a (i) above. **(1mark)**

5. The equation below shows an oxidation reaction of food substances.

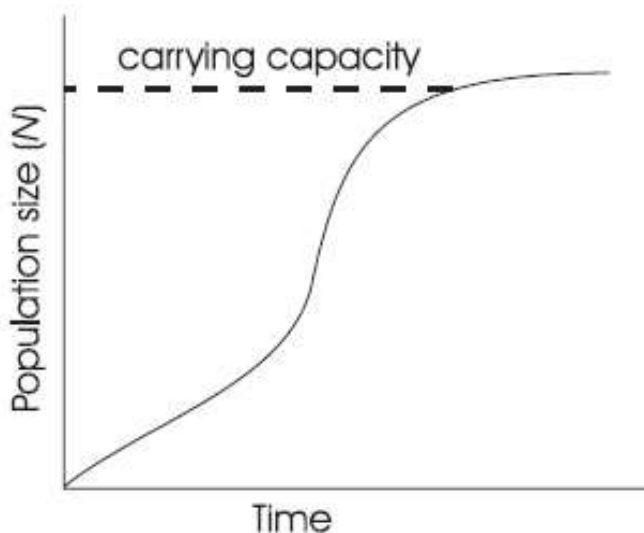


a) What do you understand by the term respiratory quotient? **(1mark)**

b) Determine respiratory quotient of the oxidation of food substance. **(2marks)**

c) Identify the food substance. **(1mark)**

6. When any one of the growth parameters such as growth in size or weight, increase in number of cells are plotted in a graph against time like below, a clear curve is obtained.



State its name. **(1mark)**

7. The embryo of a dry, fully developed seed usually passes through a period of rest after ripening period and it cannot germinate even when provided with all favorable conditions. State the significance of this. **(2marks)**

8. a) Cowpeas seeds were placed in a vacuum flask and left for five days. What is the expected change in composition of gases in the flask on the sixth day? **(1mark)**

b) Give a reason for your answer in (a) above **(1mark)**

9. Biotechnologists work day and night to curb food insecurity using the knowledge of polyploidy in genetics. Explain the economic importance of such practice? **(2marks)**

b) Define a backcross? **(1 mark)**

10. The structure below was obtained from an animal cell



a) What is the name of the hair-like structure and state its function? **(2marks)**

b) From which parts of the mammalian body are these structures found? **(1mark)**

11. A student was found to have blood group B+.

a) What type of antibody is present in his plasma?

(1mark)

b) Which antigens are present in this blood group?

(1mark)

12. Plants relatively have less waste to excrete than animals. Give **ONE** reasons to explain this observation,

(1marks)

13. State **TWO** methods by which plants get rid of their waste products.

(2marks)

14. To estimate the population size of mosquitoes in **Banji** village that covers an area of 25km², visiting researchers caught 400 mosquitoes which they marked and released. After 24 hours, 200 mosquitoes were caught out of which 120 had not been marked.

(a) Suggest the sampling method described above.

(1 mark)

(b) What are the disadvantages of this method?

(2 marks)

15. The table below shows stomatal distribution on leaves A and B and their surface area. Use the information to answer the questions.

	Leaf surface	A	B
Number of stomata	Upper leaf surface	20	5
	Lower leaf surface	0	15
Surface area		25 cm ²	18cm ²

Identify with reasons the habitats of the plant from which the leaves were obtained.

Leaf A: Habitat:

(1 mark)

Reason; (1 mark)

Leaf B: Habitat: (1 mark)

Reason: (1 mark)

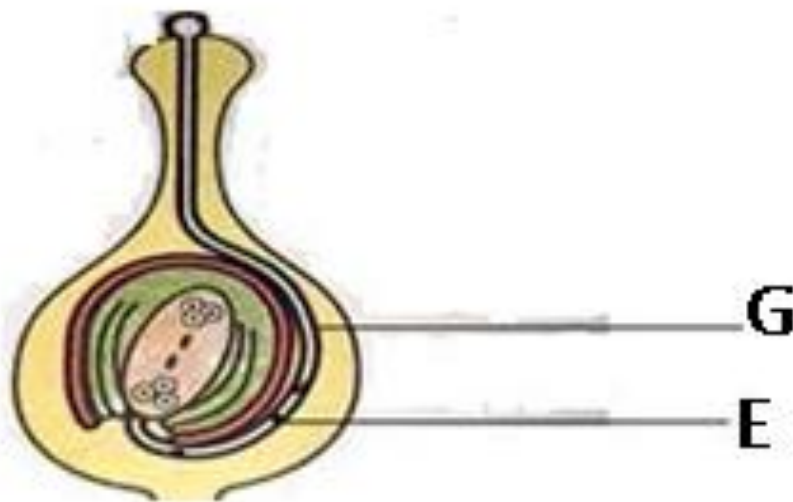
16. Name the causative agent of the following diseases. (2 marks)

(i) Trichomoniasis.

(ii) Gonorrhea.

17. The diagram below shows a pollen tube as it develops down the style.

Use it to answer the questions that follow;



(i) Name the part labelled **G**. **(1 mark)**

(ii) State **two** functions of part labelled E. (2 marks)

18. (a).Define parthenocarpy.

(1 mark)

(b)Name the plant hormone that induces fruit ripening.

(1 mark)

19. A group of Form Three students collected a certain specimen for study as shown below. Study it carefully and use it to answer the questions that follow.



(i)Name the type of metamorphosis that the above specimen undergoes.

(1 mark)

(ii)Give any **two** advantages of the above metamorphosis.

(2 marks)

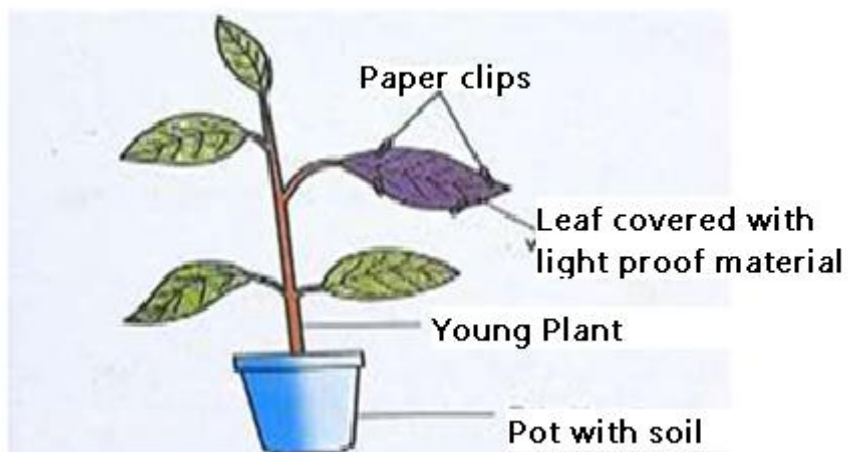
20. (i).Give **two** structural features in a leaf that adapts it to absorb Carbon (IV) Oxide.

(2 marks)

(ii)Name the cell organelle in which Carbon (IV) oxide combines with water to form a complex organic compound takes place.

(1 mark)

21. In an experiment to investigate a factor affecting photosynthesis; leaf of a potted plant, which had been kept in the dark overnight was covered with an aluminum foil as shown in the diagram below. The set up was kept in the sunlight for three hours after which food test was carried out.



(a) Which factor was being investigated in the experiment? **(1 mark)**

(b) Which food test was carried out? **(1 mark)**

(c) State the results of the food test. **(1 mark)**

22. Explain how the following plant adaptations minimizes rate of transpiration. **(2marks)**

a) Sunken stomata.

b) Thick cuticle.

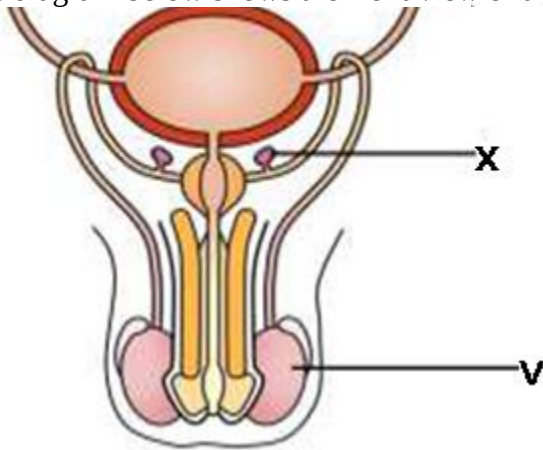
23. Explain how drooping of leaves on a hot sunny day is advantageous to a plant.

(2marks)

24. Name **two** tissues in plants which are thickened with lignin.

(2marks)

25. The diagram below shows the front view of a male reproductive system.



a) Give the functions of the structures labelled **X** and **V**.

(2marks)

b) What is the role of Follicle Stimulating Hormone in male reproduction?

(1mark)

26. How do the following factors hinder self-pollination in flowering plants?

(3marks)

a) Self-sterility.

b) Heterostyly.

c) Protogyny.

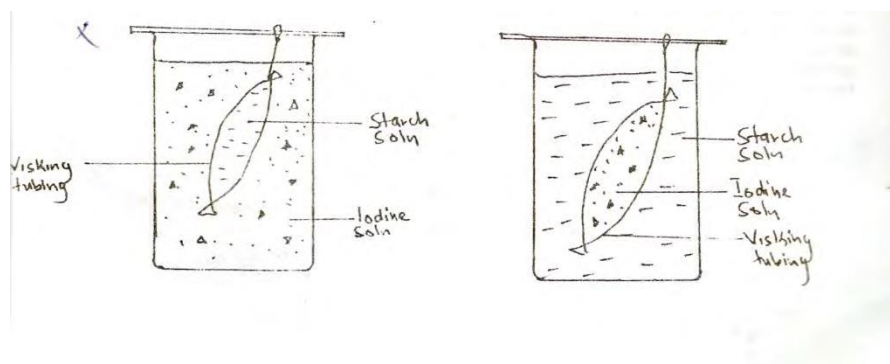
27. The table below shows the concentration in parts per million of sodium and iodide ions in sea water and cell sap of a plant.

	Sodium ions concentration	Iodide ions concentration
Sea water	326	39
Cell sap	162	574

a) i) Which of the two ions intake will be affected if the plant was sprayed with a chemical that inhibits respiration. **(1mark)**

ii) Explain your answer in 27(a) (i) above. **(1mark)**

b) An experiment was set up as shown in the diagram below.



At the end of the experiment, it was observed that the starch turned blue black while the color of iodine solution in the beaker did not change. Account for this observation. **(2 marks)**

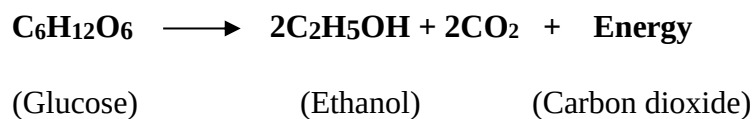
28. State the role of the following organelles: **(3 marks)**

a) Ribosomes.

b) Chloroplast.

c) Nucleus

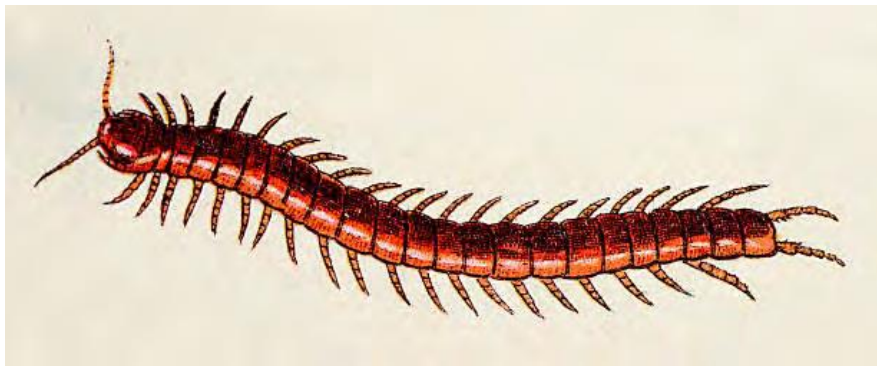
29. A process that occurs in plants is represented by the equation below.



a) Name the process. (1 marks)

b) State **two** economic importance of the process named in (a) above. (2 marks)

30. Below is a diagram of an organism.



a) Identify the Class to which the organism belongs. (1 mark)

b) State **two** features shown on the diagram that are characteristics of this Class.

SERIES 3

1. (a) Differentiate between gaseous exchange and ventilation. (2 marks)

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- (b) Name the respiratory sites of the following:

- (i) Fish (1 mark)

.....

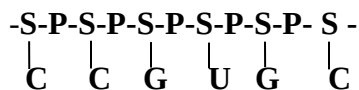
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- (ii) Insects (1 mark)

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2. A portion of a nucleic acid is shown below;



- a) Name the nucleic acid to which the portion belongs. Give a reason. (2 marks)

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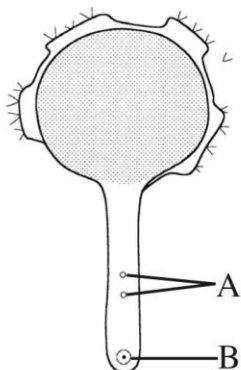
- b) Write down the sequence of bases of a complimentary strand to the one above. (1 mark)

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3. The diagram below illustrates a growing pollen tube



a) Name the part labeled B (1mark)

.....

.....

.....

b) Explain the role of parts labeled A (2marks)

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4. Name **two** components of Mammalian blood that play a role in blood clotting. (2mks)

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5. (a) Name the parts of a mammalian ear which carry out the following functions.

i) Balance and posture. (1 mark)

.....

.....

ii) Hearing. (1 mark)

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.....

(b) State the importance of presence of glands in auditory canal. (1 mark)

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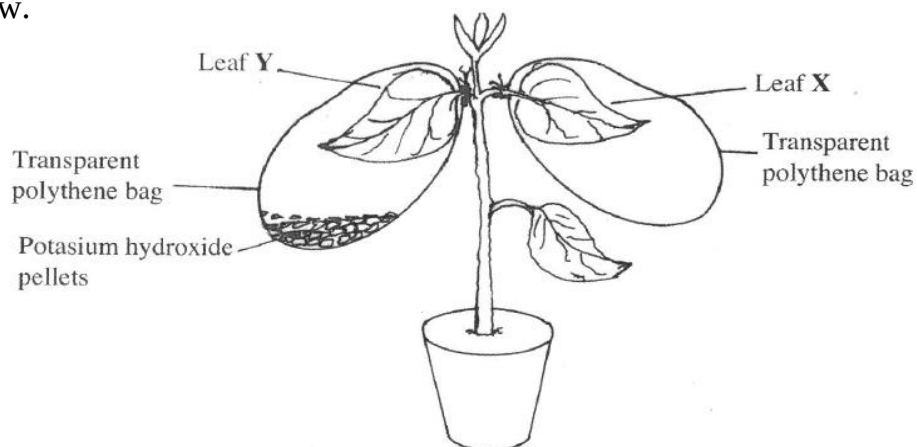
6. (a) State the function of co-factors in cell metabolism. (1mark)

.....

.....

(b) Give one example of a metallic co-factor. (1 mark)

7. A potted plant was kept in the dark for 48 hours. Two leaves **X** and **Y** were treated as shown in the diagram below.

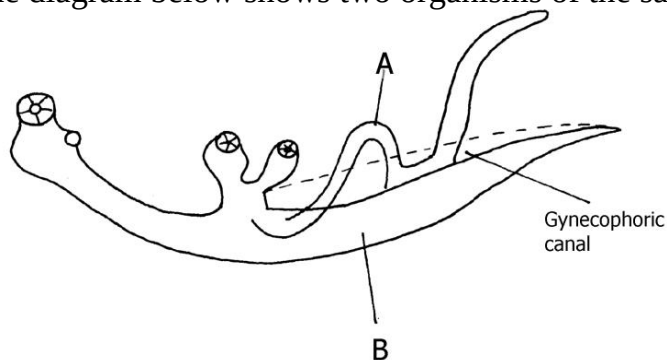


The experimental set-up was kept in sunlight for 6 hours after which starch test was carried out on the two leaves.

- a) Give a reason why potassium hydroxide pellets were put in a transparent polythene bag with leaf **Y** (1mark)

- b) What were the results of the starch test on leaves X and Y? (2marks)

8. The diagram below shows two organisms of the same species (2marks)



- a) State the sex of organism A and B. (2marks)

.....
.....
.....

b) Name the disease caused by the above organism. (1mark)

.....
.....

9. Identify the physiological process involved in the following

a) Feeding in Venus fly trap (insectivorous plant) (1mark)

.....
.....

b) Absorption of mineral salts by plant roots. (1mark)

.....
.....

10. a) Explain how the following parts of a mammalian reproductive system are adapted to their functions. (2 marks)

i) Testis

.....
.....
.....

ii) Uterus

.....
.....
.....

b) Explain why removal of the ovary after four months of pregnancy does not terminate pregnancy. (2 marks)

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11. State the role of the following hormones in homeostasis

i) Antidiuratic hormone (vasopressin) (1 mark)

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.....

ii) Aldosterone hormone (1 mark)

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.....

12. Name parts of the brain which control

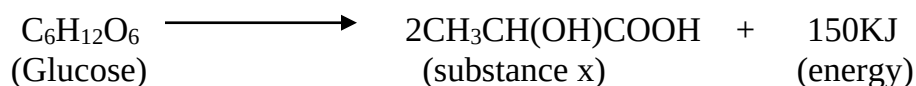
(a) Involuntary activities e.g breathing (1mark)

.....
.....

(b) Control voluntary body movement (1mark)

.....
.....

13. During a strenuous exercise, the chemical process represented by the equation below takes place in human muscles



(a) What is the name of this process (1mark)

.....
.....

(b) Name the substance X (1mark)

.....
.....

(c) What happens to the muscle if x accumulates to critical level (1mark)

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14. (a) Define the term 'parthenocarypy'. (1mark)

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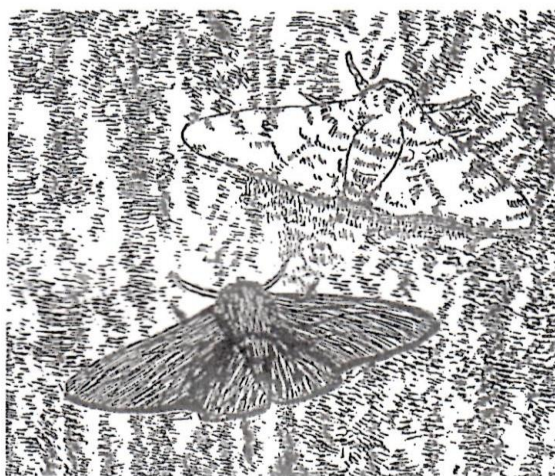
(b) Name **two** plant growth hormones that promote parthenocarpy. (2marks)

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15. The photograph below are two varieties of peppered moth *biston betularia* resting on the bark of a tree. (3marks)



Explain using the photograph how natural selection will determine the survival of each variety. (3marks)

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16. State the importance of the following features of mammalian lungs.

(a) Spongy and elastic (1 mark)

.....

.....

(b) Pleural fluid (1 mark)

.....

.....

17. Identify the use of the following apparatus (3marks)

(i) Bait trap

.....

.....

.....

(ii) Specimen bottle

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(iii) Pitfall trap

.....

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18. State **two** feature common in mammals and bird (2 marks)

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19. The lungs and ileum are adapted for absorption. State **three** features they have in common which facilitate absorption. (3marks)

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20. (a) Why is blood group AB described as universal recipient? (2mks)

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(b) Suggest why blood does not clot in blood vessels of a healthy person. (1 mark)

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21. (a) State why the placenta is considered as an endocrine gland. (1 mark)

.....

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(b) Describe how the embryo in human is protected during pregnancy. (2marks)

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22. State **three** effects of dumping untreated sewage into a river. (3marks)

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23. (a) State **three** functions of Obturator Foramen in the pelvic girdle in a mammal. (3marks)

.....

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.....

(b) What is a

(i) Tendon? (1mark)

.....

.....

.....

(ii) Ligament?

(1 mark)

.....

.....

.....

24. (a) Name the plant excretory product which is used for:

(i). Treatment of malaria.

(1 mark)

.....

.....

(ii). As a beverage.

(1 mark)

.....

.....

(b) Explain why lactic acid is not considered as an excretory product though it's toxic to tissues.

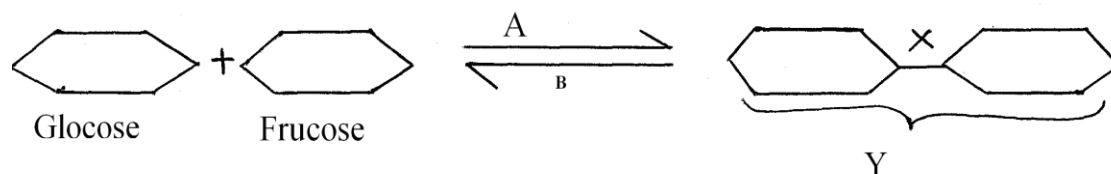
(1 mark)

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.....

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



i) State the biological process that takes place represented by A

(1mark)

.....

.

ii) What Biological process is represented by B

(1mark)

.....

.....

iii) State the product Y

(1mark)

.....

.....

iv) State the bond represented by X

(1mark)

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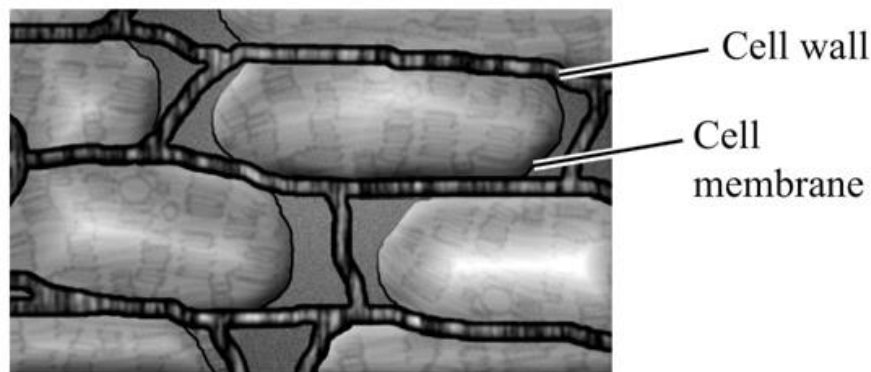
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26. Give **three** components of a simple reflex arc.

(3 marks)

SERIES 4

1. Name the **two** main components of an ecosystem (2 marks)
.....
.....
2. a) Name an element which is present in proteins but not in carbohydrates. (1 mark)
.....
b) State **two** functions of proteins in the human body (2 marks)
.....
.....
3. State the importance of a dichotomous key in the study of biology? (1 mark)
.....
.....
4. The photograph below shows cells from potato chips placed in saturated salt solution.



Explain the appearance of these cells. (3 marks)

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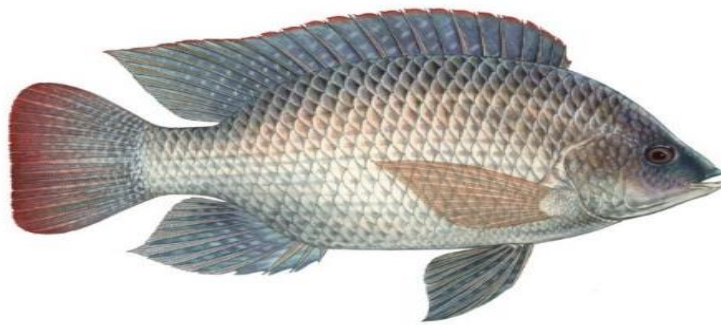
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5. State the function of the following parts of the kidney nephron: (2 marks)
 - (i) Proximal convoluted tubule
.....
.....
 - (ii) Loop of Henle
.....
.....
6. a) Give the differences between the following structures in wind and insect pollinated flowers. (3 marks)

Structure	Wind pollinated flower	Insect pollinated flower
Anther		
Pollen grains		
Stigma		

b) What is the importance of cross pollination? (1 mark)

-
-
7. Explain **three** ways in which the alveolus of the human lung is adapted to its function. (3marks)
-
-
-
8. State **one** way certain plants excrete the following metabolic wastes: (2marks)
- a) Excess water
-
- b) Caffeine
-
9. The diagram below illustrates an organism commonly found in fresh water lakes. Study it and answer the questions that follow.



- a) Name the class to which the organism belongs (1 mark)
-
- b) Using observable features on the diagram, give **two** reasons for your answer in (a) above. (2 marks)
-
-
-
-
10. a) Name **two** diseases babies should be immunized against soon after birth. (2 marks)
-
-
- b) State **two** importance of blood clotting after an injury. (2 marks)
-
-
11. Explain the role of a producer in a food chain (1 mark)
-
-
12. State **two** functions of aerenchyma tissue in aquatic plants (2 marks)
-
-
13. What changes take place during exhalation in the following parts of a mammalian breathing system?
- i) Intercostal muscles (1 mark)
-
-
- ii) Diaphragm (1 mark)

14. State **three** differences between mitosis and meiosis (3marks)

Mitosis	Meiosis
i)	
ii)	
iii)	

15. Name **two** plant processes in which diffusion plays an important role. (2marks)

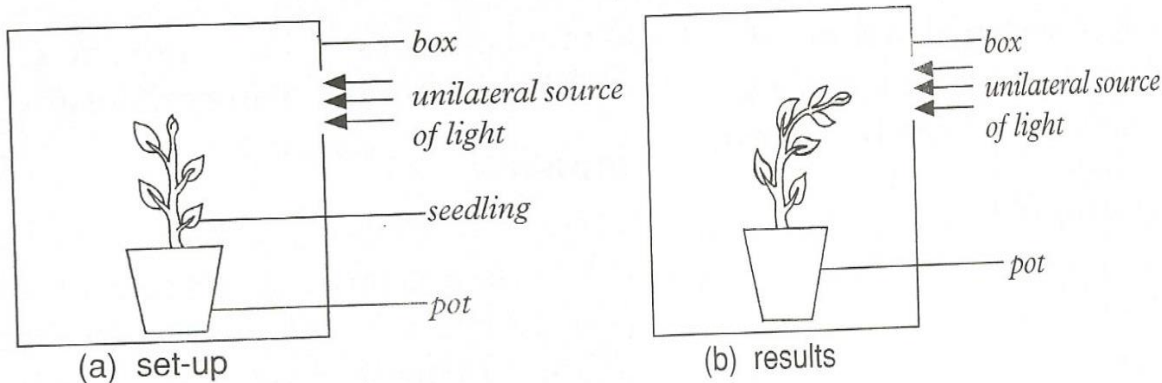
16. Describe how you would estimate the population of grasshoppers in your school Football field (4 marks)

17. a) In what form is energy stored in muscles? (1 mark)

b) Write a word equation for anaerobic respiration in plants (1 mark)

c) Give a reason why fats are respired less often in the human body yet they yield higher amounts of energy per unit weight than carbohydrates. (1 mark)

18. An experiment was set up to investigate a certain aspect of response in plants. A seedling was exposed to unidirectional light as shown in figure (a) below. After 48 hours, the result of the set up was as shown in figure (b).



i) Name the response exhibited by the seedling (1 mark)

ii) Explain the growth response shown by the seedling. (2 marks)

19. a) In a certain bird species, the spotted pattern of feathers is controlled by a dominant gene **B**,

and the plain pattern by a recessive gene **b**. If a heterozygous spotted bird were crossed with a plain feathered bird, work out the genotypes of the F1 generation. (4 marks)

.....

.....

b) Give an example of a genetic disorder in human caused by:

i) Non-disjunction of chromosomes. (1 mark)

.....

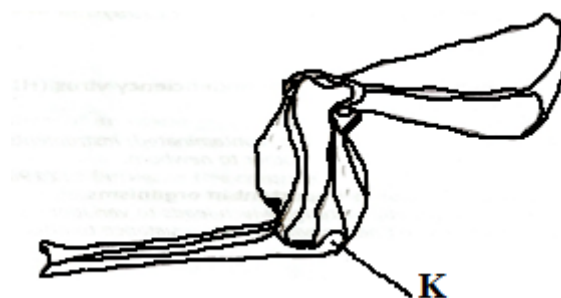
ii) Gene mutation (1 mark)

.....

20. State **two** differences between the composition of blood entering the liver via hepatic portal vein and blood leaving the liver to the heart via hepatic vein. (2 marks)

Blood entering the liver	Blood leaving the liver
i)	
ii)	

21. The diagram below shows the arrangement of bones and muscles in a human arm.



a) Name part **K** of a bone at the elbow and state its significance (2 marks)

Name.....

Significance.....

.....

b) Explain how the muscles shown in the diagram work to extend the arm at the elbow. (2 marks)

.....

.....

22. a) Apart from temperature, list **two** other factors that affect active transport in plant roots.

(2 marks)

.....

.....

b) Explain how temperature affects active transport in plant roots (2 marks)

...

23. a) Define the term 'fossil'. (1 mark)

.....

.....

b) Name the type of evolution that lead to formation of homologous structures? (1 mark)

.....

c) Give **two** examples which offer evidence of natural selection in action. (2 marks)

.....

.....

24. Explain the role of the following parts of the mammalian skin. (2 marks)

i) Malpighian layer

.....

.....

ii) Sweat gland

.....

.....

25. a) Name the tissue responsible for secondary growth in dicotyledonous plants. (1 mark)

.....

b) List the stages of metamorphosis in a cockroach (1 mark)

.....

26. a) A student looks at a clock at the far end of a classroom and then looks at a diagram on her examination paper. State the changes that would take place in her eyes so that she can focus the image of the diagram on the retina. (2 marks)

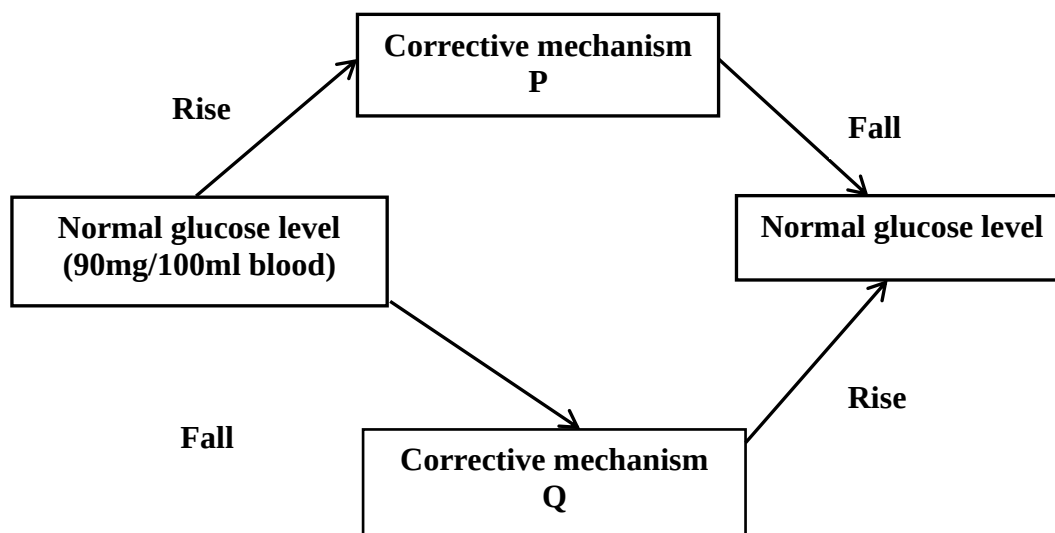
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.....

b) Name the part of the human brain responsible for body balance and posture (1 mark)

.....

27. The diagram below shows how blood glucose level is regulated in the mammalian body.



a) Explain what happens during corrective mechanism **P**. (3 marks)

.....

.....

b) Name the hormone involved in corrective mechanism **Q**. (1 mark)

.....

28. State **two** importance of support in plants. (2 marks)

SERIES 6

1. (a) Name **two** enzymes in the human digestive system which are secreted in an inactive form. (2 marks)

.....

.....

.....

- (b) State the term used to describe the inactive form of enzymes named above. (1 mark)

.....

- (c) Explain why the above named enzymes should be secreted in inactive form. (1 mark)

.....

.....

.....

2. One of the importance of studying biology in high school in the todays world is enhancing international cooperation for example: management of resources through international treaties such as **CITES**.

- (a) What does the acronym **CITES** stands for. (1 mark)

.....

.....

- (b) List **two** environmental problems solved by knowledge acquired when studying biology. (2 marks)

.....

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3. (a) Name a scientific theory that explain the origin of life. (1 mark)

.....

.....

- (b) List **two** methods used by scientists to determine the age of the fossils. (2 marks)

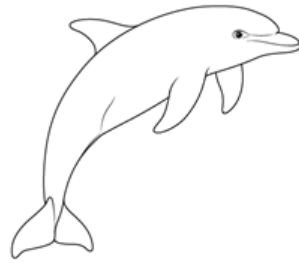
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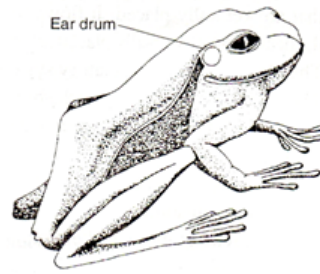
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4. The diagram below shows members of a certain group of organisms found in a certain habitat.

Use them to answer the questions that follow.



Organism W



Organism X

- (a) Name the Phylum into which the above organisms belongs. (1 mark)

.....
.....

- (b) Name the class into which organism **W** belongs. (1 mark)

.....
.....
.....

- (c) Explain why the heart of organism **X** is said to be inefficient as compared to human heart. (2 marks)

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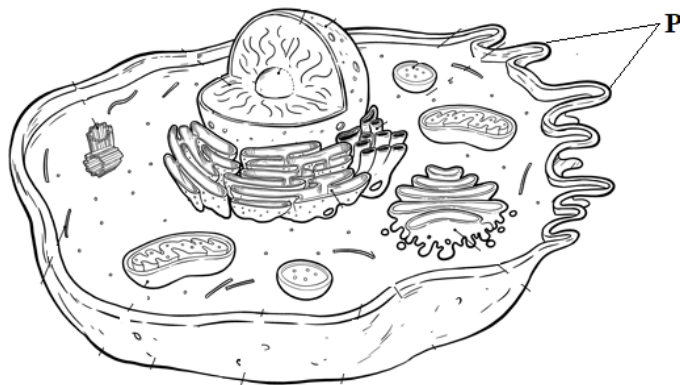
5. (a) In radishes, red and white are pure-breeding colors, while hybrids are purple. If a red radish is crossed with a white radish, what will be the phenotype of the F₂ generation (assuming the F₁ generation self-pollinates)? (use letter **R** for red and **W** for white) (4 marks)

.....
.....
.....

- (b) Workout the phenotypic ratio of the cross above. (1 mark)

.....

6. The diagram below shows a cell as seen under an electron microscope by a student at Milima mingi secondary school. Use the diagram to answer the questions below.



- (a) On the diagram, using letter **K**, label the structure that forms the spindle fibres during mitosis. (1 mark)
- (b) Name the structure labeled **P** and state its function. (2 marks)

.....

.....

.....

7. (a) In an experiment, a student was trying to observe a slide with a plant upper epidermis and could not see the image through the eye piece lens. Identify a procedural mistake that she could have made. (2 marks)

.....

.....

8. (a) Distinguish between epigeal germination and hypogeal germination. (1 mark)

.....

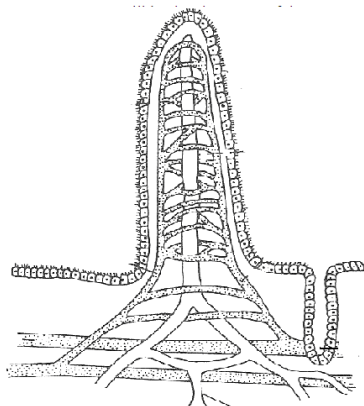
.....

- (b) Name **two** regions here secondary growth occur in plants. (2 marks)

.....

.....

9. The diagram below shows pat of the alimentary canal in animals. Study it to answer the questions that follow.



- (a) Identify the structure drawn above. (1 mark)

.....

.....

(b) (i) Name **one** common Protozoan disease that affect human in the part shown above. (1 mark)

.....

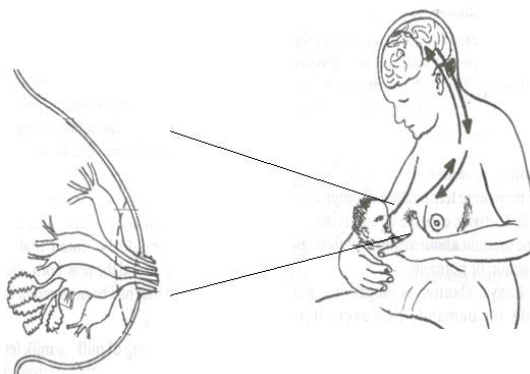
.....

(ii) Name the causative agent of the disease named above. (1 mark)

.....

.....

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



(a) Name the hormones responsible for the following processes:

I Milk secretion (1 mark)

.....

II Milk letdown. (1 mark)

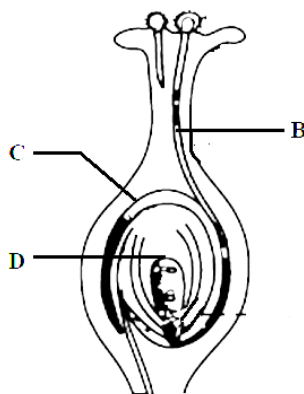
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III State **one** condition that may inhibit milk letdown. (1 mark)

.....

.....

11. A student drew the diagram below after carefully observing a certain process in a school botanical garden. Use the diagram to answer the questions that follow.



(a) Identify the type of cell division that takes place around region labeled **B**. (1 mark)

.....
.....

(b) Name the parts labeled **C** and **D**.

C:(1 mark)

D:(1 mark)

12. A doctor during a routine check-up found a child with an abnormal bone formation and an adult with soft and brittle bones.

(i) Name the vitamin that was deficient in the diet. (1 mark)

.....
(ii) State **one** way of controlling the condition above. (1 mark)

.....

(iii) Define the term assimilation. (1 mark)

.....

13. How are water dispersed seeds suited to their dispersal? (3 marks)

.....
.....

14. A person was found to pass out large volumes of dilute urine frequently. Name the

(a) Disease the person was suffering from. (1 mark)

.....

(b) Hormone that was deficient (1 mark)

.....

15. Name **three** aspects of growth in living organisms that can be quantified to determine growth.

(3 marks)

.....
.....
.....
.....

16. State **two** functions of the DNA molecule in living organisms.

(2 marks)

.....
.....
.....
.....

17. State **two** characteristics of mesophytes' habitat. (2 marks)

.....
.....

18. Briefly, explain the role of the following in the immune system of animals.

I Lymphocytes

(1 mark)

.....
.....

II Antibodies

(1 mark)

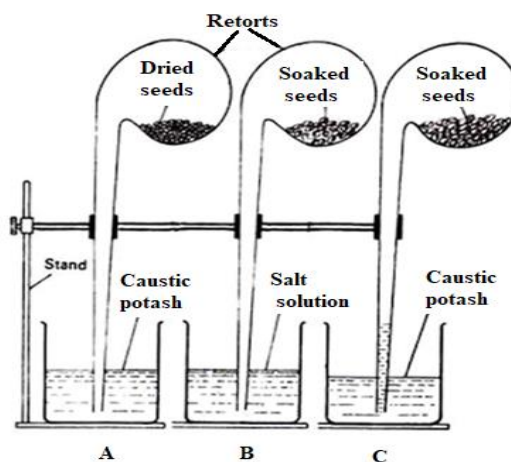
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.....

III Phagocytes

(1 mark)

.....
.....

19. An experiment was conducted by some students as illustrated in the diagram below. Study it to answer the questions that follow.



(a) State the aim of the experiment.

(1 mark)

.....
.....

(b) State and explain the observations made in set-up C above.

Observations:.....(1 mark)

Explanation:

(2 marks)

.....

(c) What is the role of set-up **A** and **B**. (1 mark)

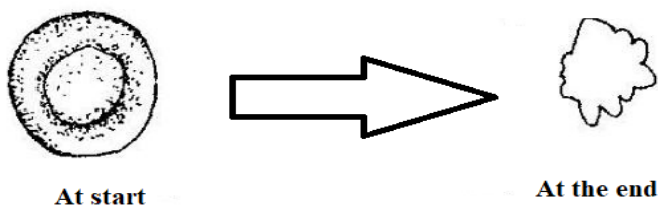
20. (i) Define the term polyploidy. (1 mark)

(ii) Polyploidy is common in plants, name the advantages associated with it. (3 marks)

21. Differentiate between open circulatory system and closed circulatory system. (3 marks)

Open circulatory system	Closed circulatory system

22. Study the diagram below to answer the questions that follow.



(a) Explain the observations in the above diagram. (2 marks)

(b) If this happened in human body, state one way of which could have led to the above situation. (1 mark)

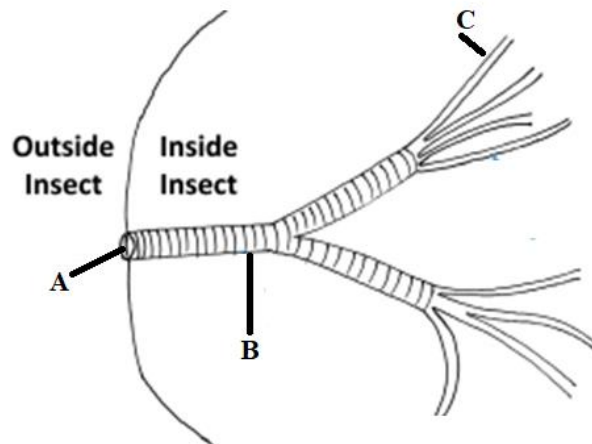
.....

(c) Draw a diagram to illustrate how a plant cell would appear if subjected to the same treatment. (1 mark)

23. Differentiate between mitosis and meiosis. (4 marks)

Mitosis	Meiosis

24. The diagram below represents part of gaseous exchange system in an organism. Study it to answer the questions that follow.



(a) Name the part labeled **A** and **C**.

A.....(1 mark)

C..... (1 mark)

(b) Give the differences between part labeled **B** and the one found in human being.

(2 marks)

.....

-
-
25. (a) State **two** physiological processes that occur on the body when body temperature rise above normal. (2 marks)

.....

.....

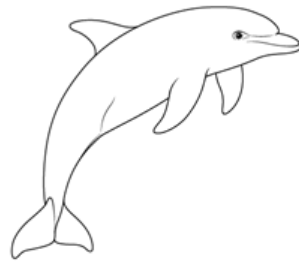
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- (b) Name the part of the skin that has melanin. (1 mark)

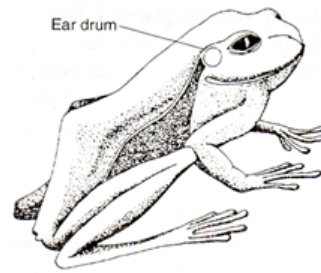
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SERIES 7

1. (a) Name **two** enzymes in the human digestive system which are secreted in an inactive form. (2 marks)
-
-
-
- (b) State the term used to describe the inactive form of enzymes named above. (1 mark)
-
- (c) Explain why the above named enzymes should be secreted in inactive form. (1 mark)
-
-
-
2. One of the importance of studying biology in high school in the todays world is enhancing international cooperation for example: management of resources through international treaties such as **CITES**.
- (a) What does the acronym **CITES** stands for. (1 mark)
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Organism X

- (a) Name the Phylum into which the above organisms belongs. (1 mark)

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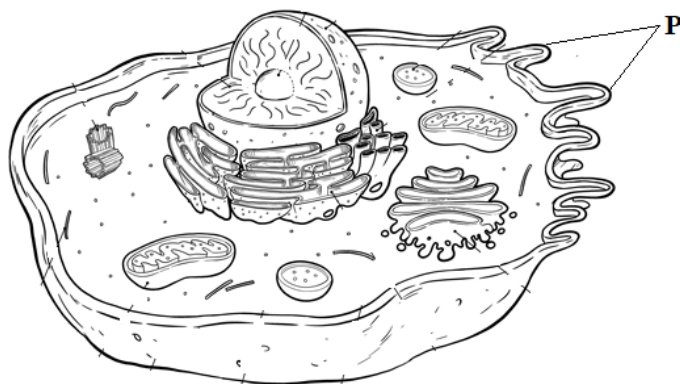
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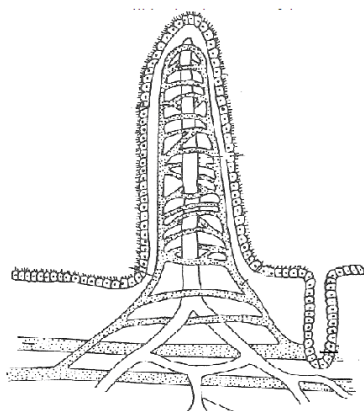
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(b) (i) Name **one** common Protozoan disease that affect human in the part shown above. (1 mark)

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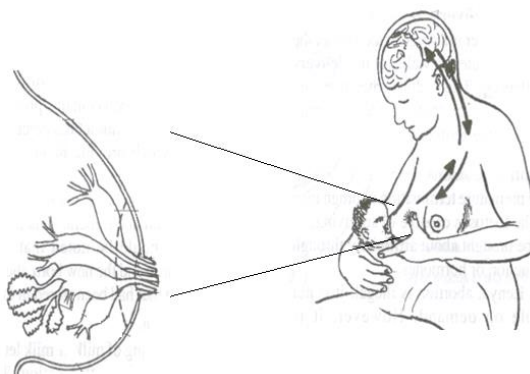
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(ii) Name the causative agent of the disease named above. (1 mark)

.....

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



(a) Name the hormones responsible for the following processes:

I Milk secretion (1 mark)

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II Milk letdown. (1 mark)

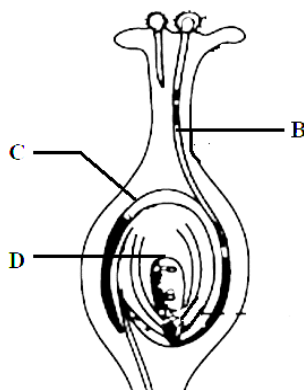
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.....

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11. A student drew the diagram below after carefully observing a certain process in a school botanical garden. Use the diagram to answer the questions that follow.



- (a) Identify the type of cell division that takes place around region labeled **B**. (1 mark)

.....

- (b) Name the parts labeled **C** and **D**.

C:(1 mark)

D:(1 mark)

12. A doctor during a routine check-up found a child with an abnormal bone formation and an adult with soft and brittle bones.

- (i) Name the vitamin that was deficient in the diet. (1 mark)

.....

- (ii) State **one** way of controlling the condition above. (1 mark)

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- (iii) Define the term assimilation. (1 mark)

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15. Name **three** aspects of growth in living organisms that can be quantified to determine growth. (3 marks)

16. State **two** functions of the DNA molecule in living organisms. (2 marks)

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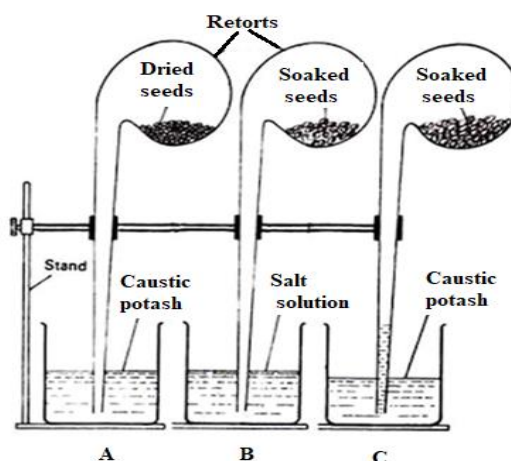
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I Lymphocytes (1 mark)

II Antibodies (1 mark)

III Phagocytes (1 mark)

19. An experiment was conducted by some students as illustrated in the diagram below. Study it to answer the questions that follow.



(a) State the aim of the experiment. (1 mark)

(b) State and explain the observations made in set-up **C** above.

Observations:.....(1 mark)

Explanation: (2 marks)

.....

.....

(c) What is the role of set-up **A** and **B**. (1 mark)

.....

.....

20. (i) Define the term polyploidy. (1 mark)

.....

.....

(ii) Polyploidy is common in plants, name the advantages associated with it. (3 marks)

.....

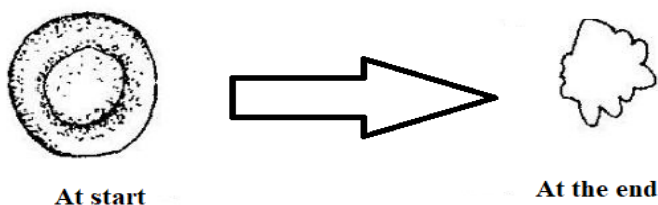
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21. Differentiate between open circulatory system and closed circulatory system. (3 marks)

Open circulatory system	Closed circulatory system

22. Study the diagram below to answer the questions that follow.



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(b) If this happened in human body, state one way of which could have led to the above situation. (1 mark)

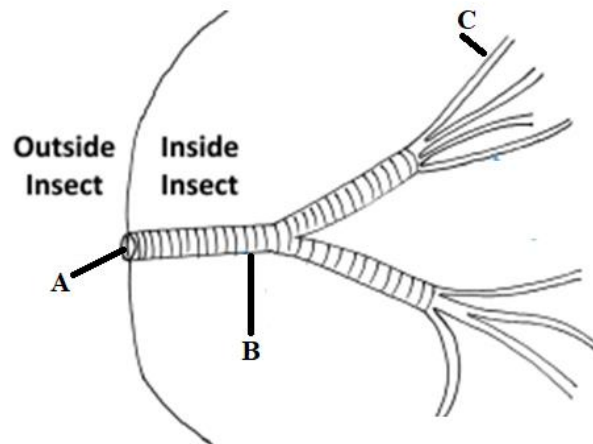
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(c) Draw a diagram to illustrate how a plant cell would appear if subjected to the same treatment. (1 mark)

23. Differentiate between mitosis and meiosis. (4 marks)

Mitosis	Meiosis

24. The diagram below represents part of gaseous exchange system in an organism. Study it to answer the questions that follow.



(a) Name the part labeled **A** and **C**.
 A.....(1 mark)

C..... (1 mark)

(b) Give the differences between part labeled **B** and the one found in human being. (2 marks)

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25. (a) State **two** physiological processes that occur on the body when body temperature rise above normal. (2 marks)

.....

.....

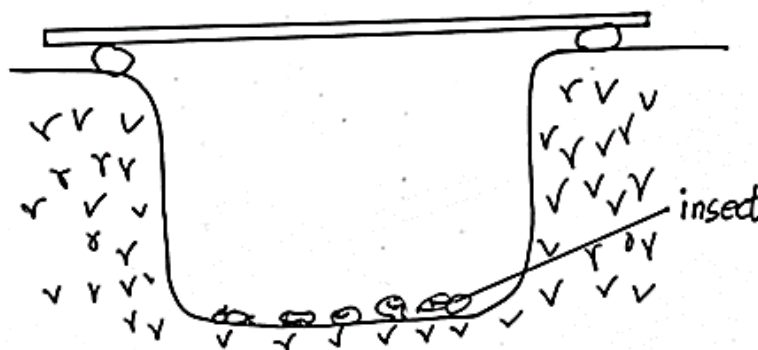
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- (b) Name the part of the skin that has melanin. (1 mark)

.....

SERIES 8

1. The apparatus below is used by entomologists in their work.



- (a) Name the apparatus (1mark)

.....

- (b) Suggest a possible way on how the efficiency of the apparatus can be improved (1mark)

.....

- 2(a) Name the organelle that:

- (i) Stores chlorophyll (1mark)

.....

- (ii) Is responsible for intracellular digestion (1mark)

.....

- (b) State the function of the following parts of a microscope (2marks)

- (i) Condenser

.....

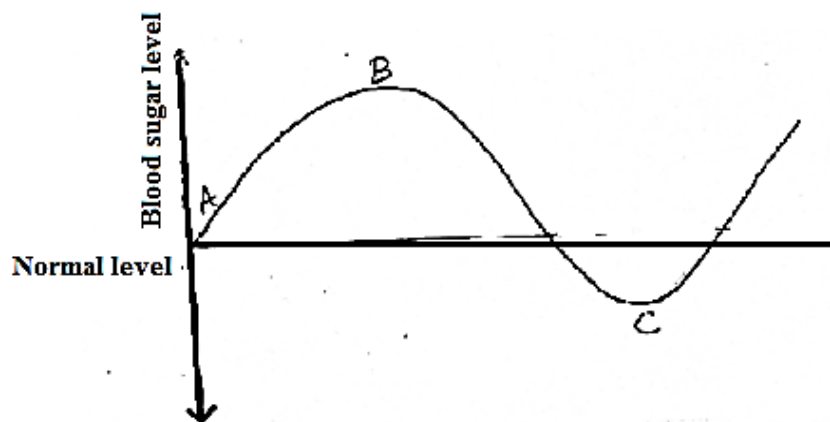
- (ii) Eye- piece

.....

- 3(a) State two components of blood that are absent in glomerular filtrate (2marks)

.....

- (b) Below is a diagram of variation in glucose concentration in human body.



(i) State the process that can lead to the shape of the curve between points A and B. (1mark)

.....
.....

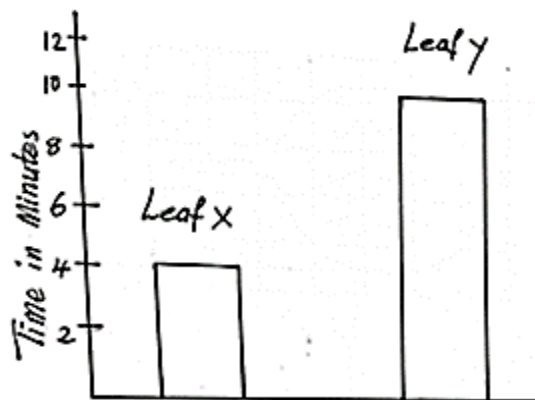
(ii) Explain the fate of excess glucose in the body. (2marks)

.....
.....

4. State two characteristics of species (2marks)

.....
.....

5. The graph below shows the time taken for cobalt (II) chloride to turn pink leaves of two plants.



(a) Identify the leaf that is likely to be:

(i) Xerophyte (1mark)

.....
.....

(ii) Hydrophyte (1mark)

.....
.....

(b) Account for the time taken for leaf Y to turn pink (2marks)

.....
.....

6(a) Name two photochemical cells in the human retina. (2marks)

.....
.....

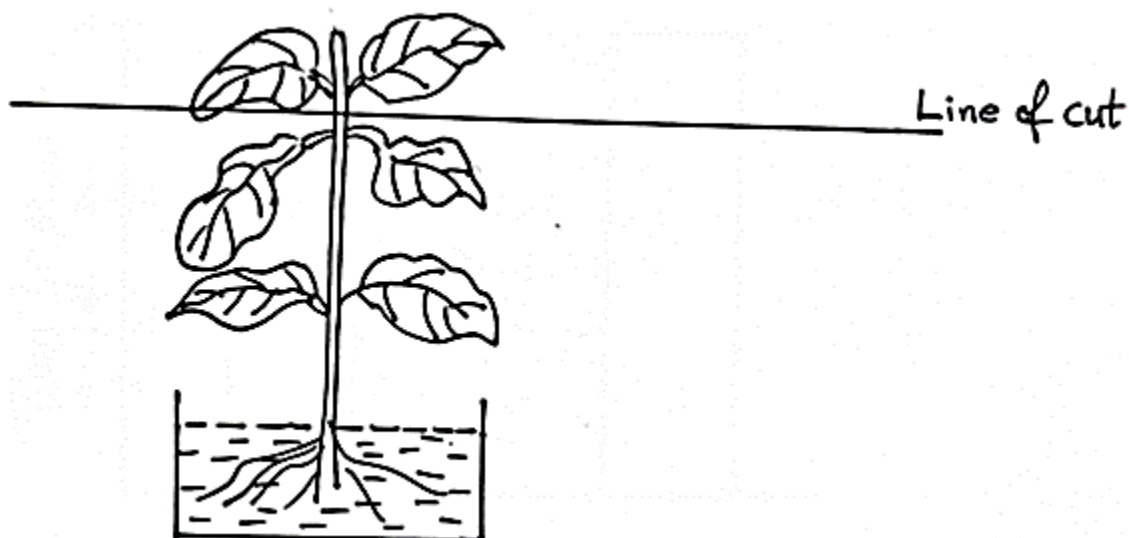
(b) Mention one chemical substance involved in nerve impulse transmission (1mark)

.....
.....

7. The diagram below shows a certain phenomenon in plants



- (i) State the type of response shown (1mark)
.....
- (ii) Give the significance of the response. (1mark)
.....
.....
- (iii) Which substance in the ear detect:
(a) Sound waves (1mark)
.....
(b) Change in posture (1mark)
.....
- 8.(a) What is eutrophication? (1mark)
.....
- (b) Distinguish between a habitat and an ecological niche. (2marks)
.....
.....
9. State three advantages of genetic engineering in coffee plants. (3marks)
.....
.....
.....
- 10(a) How are spiracles in insects adapted to their functions? (2marks)
.....
.....
- (b) List the gaseous exchange sites in terrestrial plants. (2marks)
.....
.....
11. Give two hormones responsible for breaking seed dormancy (2marks)
.....
.....
12. In an experiment the shoot tip of a plant was decapitated as shown below.



(a) State the expected results after 2 weeks (1mark)

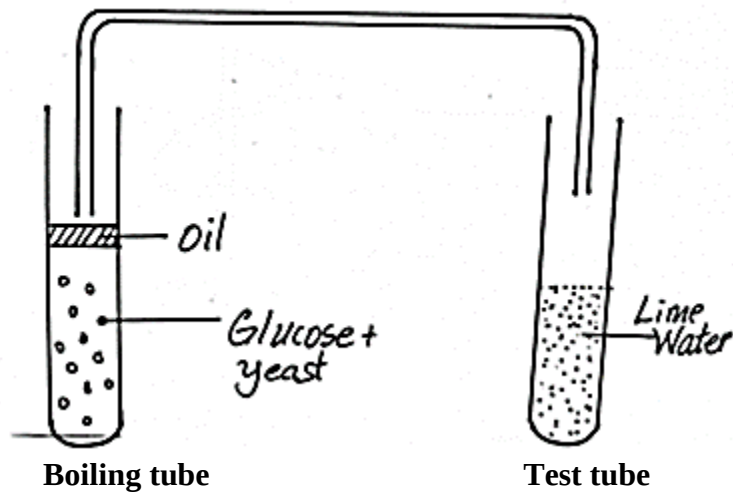
.....

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

.....

.....

13. The set up below was aimed at investigating a certain process.



(a) What was the role of oil in the set-up? (1mark)

.....

(b) Account for the observation in the test tube (3marks)

.....

.....

.....

14(a) Name the main feature that differentiate axis from other cervical vertebrae (1mark)

.....

.....

(b) State the fins that control: (2marks)

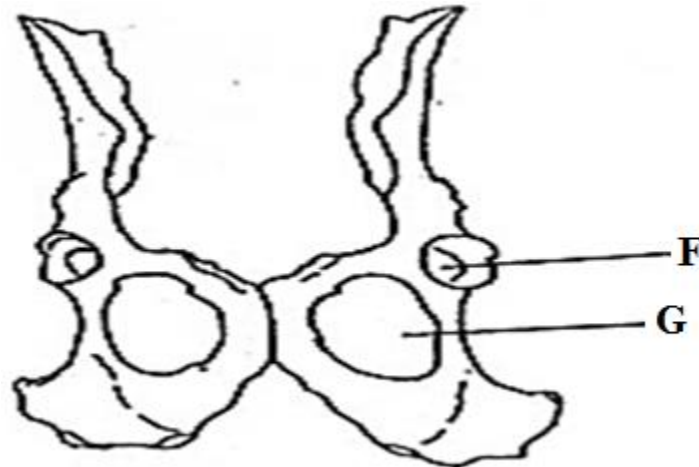
(i) Yawing

.....

(ii) Pitching

.....

15. The diagram below shows a bone.



(a) Name the hole marked G. (1mark)

.....

(b)(i) Identify the bone that articulates with the structure F. (1mark)

.....

(ii) State the joint formed when the bone identified in (b) (i) articulates with structure F (1mark)

.....

16. An experiment was carried out to investigate the effect of pH on the rate of enzyme –catalyzed reaction. The results were tabulated as shown:

pH	0.5	1.5	2.0	3.0	4.0	5.5	7.0	8.0	9.0	
Rate of reaction in mg of product per unit time	0.2	1.5	2.3	3.4	2.2	0.1	0.0	0.0	0.0	Enzyme R
	0.0	0.0	0.0	0.0	0.8	1.6	2.6	3.2	1.2	Enzyme T

(a) What is the optimum pH of each enzyme. (2marks)

Enzyme R

.....

Enzyme T

.....

(b) Assuming that the two enzymes are involved in human digestion, suggest the likely identity of enzyme R and name the part of the alimentary canal where it is found (2marks)

Enzyme R

.....

Region

.....

17. Identify the key principles of Lamarck's theory (2marks)

18. Briefly explain how cell biology can be an evidence of organic evolution. (3marks)

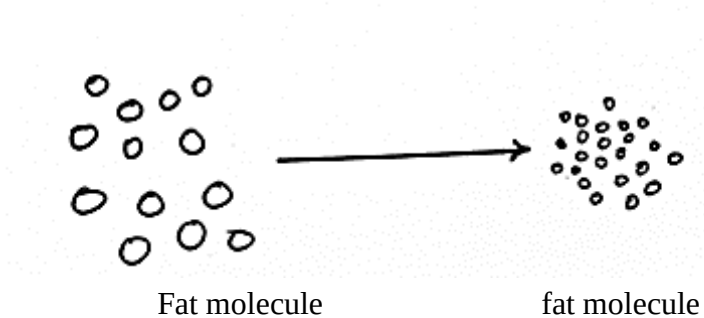
19. State the stage of cell division in which the following events occur:
 (a) Replication of genetic material (1mark)

 (b) Exchange of genetic material. (1mark)

20. Using the roles of follicle stimulating hormone and progesterone, explain how menstrual cycle is a negative feedback mechanism (2marks)

21. When Amoeba and red blood cells are placed in distilled water, the red blood cell burst but amoeba doesn't burst yet, both lack cell walls. Explain this observation. (2marks)

22. The illustration below shows a biological process in animals.



- (i) Name the process (1mark)

- (ii) State the biological significance of the above process. (2marks)

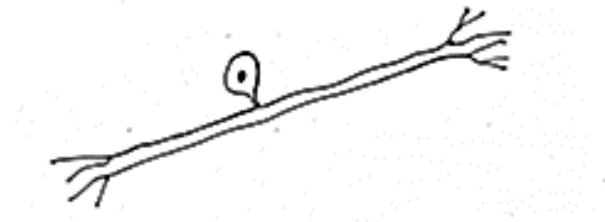
- (iii) Give the digestive juice used in the process above (1mark)

23. State the importance of the following;
- (i) Reversed stomata rhythm to desert plants (1mark)
-
-
- (ii) Closing of stomata on a hot dry sunny day. (1mark)
-
-

24. Differentiate between smooth and skeletal muscles (2marks)
-
-

25. What changes occur in arterioles during thermoregulation in humans. (2marks)
-
-

26. The diagram below shows a specialized cell.



- (a) Identify the type of neuron (1mark)
-

- (b) Give a reason for your answer (1mark)
-

- (c) State the role of the cell (1mark)
-
-

27. Name the causative agents of the following:

- (a) Amoebic dysentery (1mark)
-

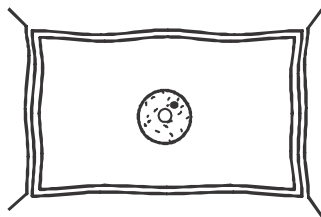
- (b) Schistosomiasis (1mark)
-

28. State two genetic disorder that affect blood in humans (2marks)
-
-

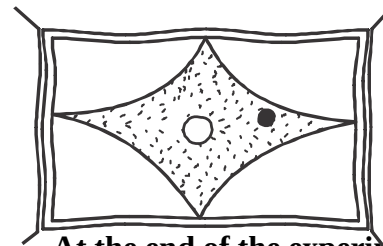
SERIES 9

1. State two characteristics of organisms that are easily observed in both animals and plants. (2marks)
2. (a) Terrestrial insects such as locusts were captured and their blood was analysed. It was found that the blood does not have blood pigments such as haemoglobin. Explain. (2 marks)
(b) State how the tracheal system in insects is adapted to gaseous exchange. (3 marks)
3. State two functions of a diastema in herbivores. (2 marks)
4. State three biotic factors that could affect an antelope living in Masai Mara. (3 marks)
5. Describe how the leaves of submerged plants are adapted to gaseous exchange. (3 marks)
6. Name the part of the seed whose growth brings about epigeal germination. (1 mark)
7. State three aspects of light that affect the rate of photosynthesis. (3 marks)
8. (a) Identify the class with organisms that have three body parts and three pairs of legs. (1 mark)
(b) Suggest three reasons why members of the class named in (a) above are adapted to all types of habitats. (3 marks)
9. (a) List three types of gene mutation. (3 marks)
(b) (i) What are sex-linked genes? (1 mark)
(ii) Name two conditions that are sex-linked. (2 marks)
10. (a) Name two digestive enzymes produced in their inactive form. (2 marks)
11. Name the organelles that carry out the following functions (4mks)
(i) Destroy old and worn-out organelles
(ii) Formation of spindle fibres
(iii) Osmoregulation
(iv) Selective passage of substances into the cell
12. (a) Why would you give an athlete glucose and not sucrose after a race? (1mk)
(b) What happens to lactic acid after oxygen debt recovery? (2mks)
13. The diagram below represents a plant cell that was subjected to a certain treatment.

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At the start



At the end of the experiment

a) Account for the shape of the cell at the end of the experiment.

(2 marks)

b) Draw a diagram to illustrate how an animal cell would appear if subjected to the same treatment. (1mk)

14. Name **two** types of valves in the heart.

(2 marks)

15.a) Name the hormones that controls metamorphosis in insects

(2marks)

b) Give one advantage of metamorphosis in insects

(1mark)

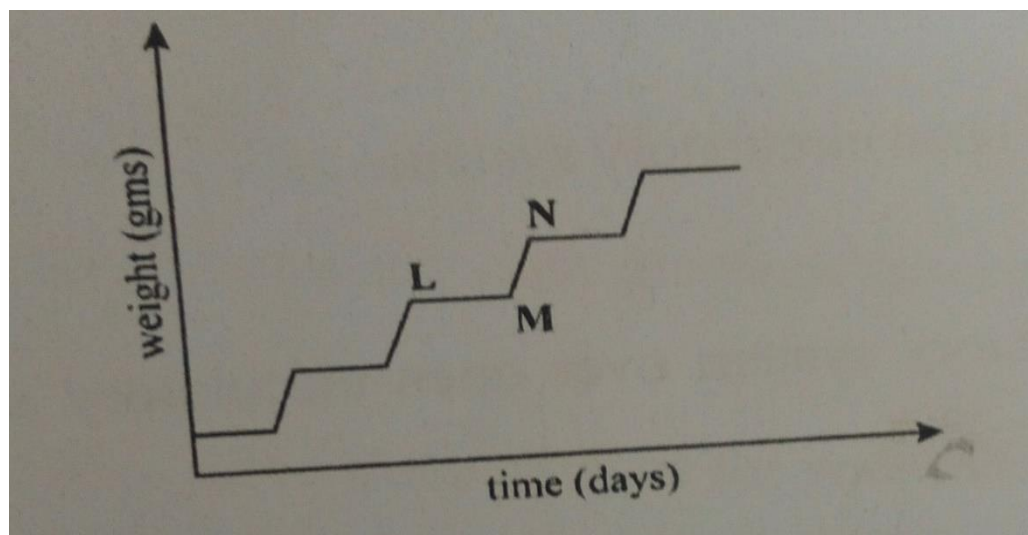
16 a Name the physiological process by which water molecules move from one cell to the other

(1mark)

b) State the significance of the process in a) above

3marks

17.The graph below represents growth pattern in a group organism



(a)Name the type of growth curve

(1 mark)

(b) Name the phylum that shows this type of pattern

(1 mark)

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(c) State one disadvantage of this type of pattern

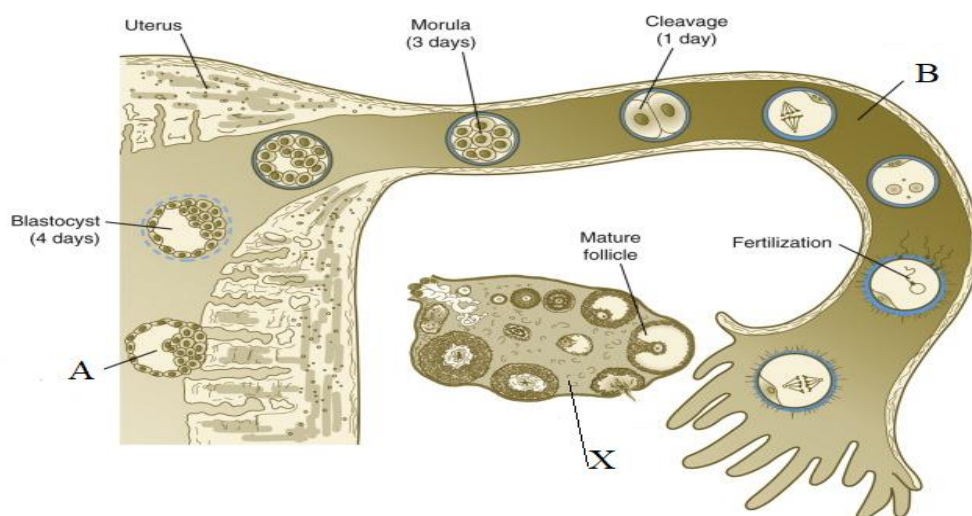
(1mark)

18(a) How would you prove that a species of wildbeest in Tanzania belongs to the same species as a similar looking wildbeest in Kenya (1 mark)

(b) State two principles of Binomial Nomenclature. (2 marks)

19. Explain how altitude may affect the rate of breathing (2marks)

20. The diagram below shows some processes that take place in the ovary and oviduct around the time of fertilization.



Name

i) The process labeled A

(1mark)

ii) Structure X and B

(2marks)

iii) The hormone produced by structure labeled X

(1mark)

21.(a) State three structural differences between arteries and veins

(3marks)

(b) Name the blood vessels that transports blood to the following;

(3marks)

i) heart to the lungs

ii) small intestine to the liver

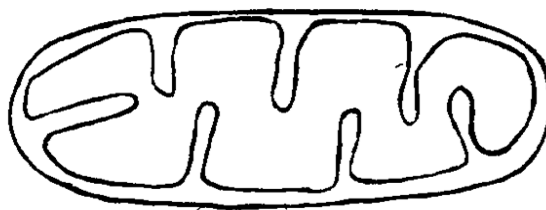
iii) Aorta to the kidney

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- 22a). State two theories that explains origin of life (2marks)
- b) State three evidences of organic evolution (3marks)
- 23.Name the causative agent of the following diseases (2marks)
- i) Malaria
- ii)Typhoid
24. State three factors that increase the rate of traspiration. (3 marks)
25. Identify three methods that cause fruit dispersal. (3 marks)
- 26.State one distinguishing characteristic of Kingdom Monera (1mark)

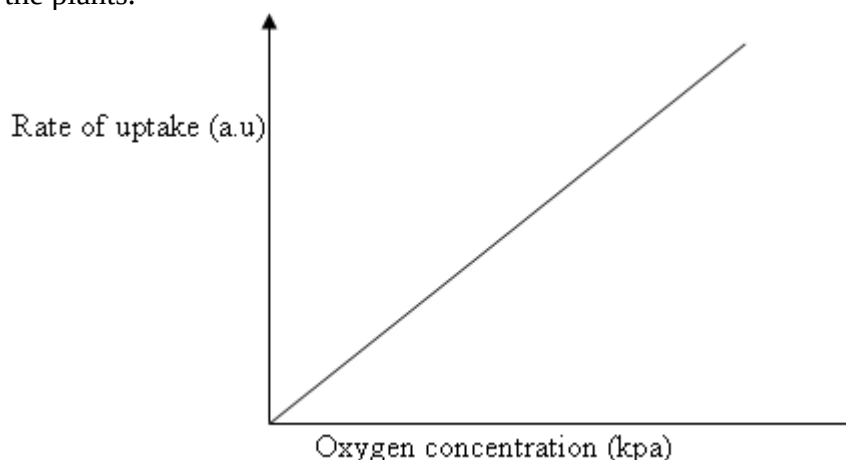
SERIES 10

1. Your teacher has allowed you to carry out a study on millipede in the school compound.
 - a) Name the apparatus you would use to collect the specimen. (1mark)
.....
 - b) What precaution will you observe to maintain ecological balance during your study? (1mark)
.....
2. Name the causative agents of the following diseases;
 - a) Cholera (1mark)
.....
 - b) i) Trichomoniasis (1mark)
.....
ii) State the mode of transmission in b(i) above. (1mark)
.....
3. State the function of the following in mammalian trachea. (3marks)
 - a) Rings of cartilage
.....
 - b) Mucus
.....
 - c) Cilia
.....
4. A young scientist observed a bird laying in a nest and later hatched into chicks. Name two characteristics shown by the chicks that show a chick is a living thing but an egg is not. (2marks)
.....
.....
5. Why is it necessary for blood from the gut to pass through the liver before joining general circulation? (2marks)
.....
.....
6. The diagram below shows the structure of an organelle.



- a) State the function of the organelle. (1mark)
.....
- b) State **one** adaptation of the above organelle to its function. (1mark)
.....
- c) Give the function of the following cell organelles
 - i) Lysosomes (1mark)
.....
 - ii) Golgi apparatus (1mark)
.....

7. The sketch below shows the concentration of oxygen in the soil and the rate of uptake of mineral salts by the plants.



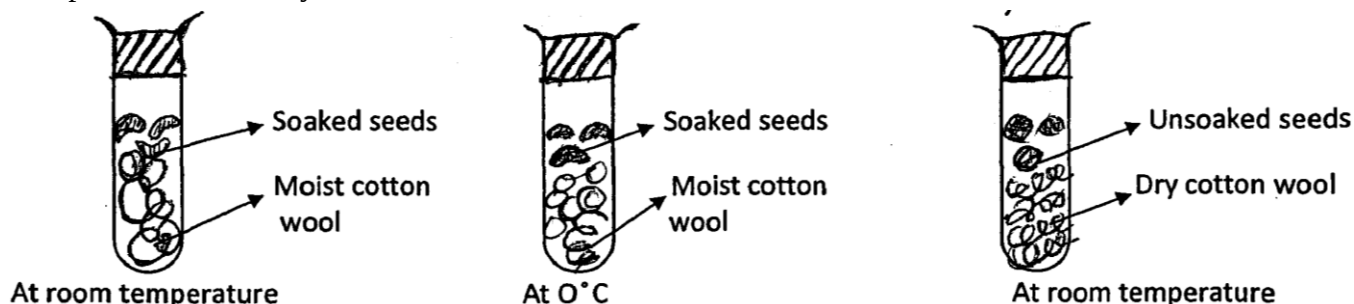
- a) Name the process by which plants in the field absorb mineral salts. (1mark)
.....
- b) State the relationship between rate of uptake of minerals salts and oxygen concentration in the soil. (1mark)
.....
- c) Give an explanation for the relationship stated in 7(b) above. (2marks)
.....
.....
8. State **three** differences between Diplopoda and chilopoda. (3marks)
.....
.....
.....
9. How does light as a biotic factor influence the distribution of plants in an ecosystem? (3marks)
.....
.....
.....
10. (a) Name the genetic disorder in human that is characterized by inability of blood to clot. (1mark)
.....
- (b) A female human was found to have an extra sex chromosome in her cells.
(i) Give the total number of chromosomes in the females individual cells. (1mark)
.....
- (ii) Explain the possible causes of this condition. (1mark)
.....
- (iii) State any **two** physical characteristics observed in the male individual with such a condition. (2marks)
.....
.....
11. a) Explain **three** limitations of fossil records as evidence of organic evolution. (3marks)
.....
.....
.....
- b) Name the evidence of organic evolution exhibited by occurrence of similar amino acid molecules in a range of organism. (1mark)
.....
12. Give the form in which the following gases are transported in blood. (3marks)

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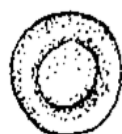
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- a) Oxygen
- b) Carbon (IV) oxide
- c) Carbon (II) oxide

13. The diagram below represents a set up to investigate the conditions necessary for seed germination. The set-up was left for 7 days.



- a) What conditions were being investigated in the experiment? (2marks)
 - b) State **two** reasons for soaking seeds in set ups A and B. (2marks)
14. State **three** ways in which root hairs are adapted to their function. (3marks)
15. The diagrams below show a red blood cell that was subjected to a certain treatment.



At start

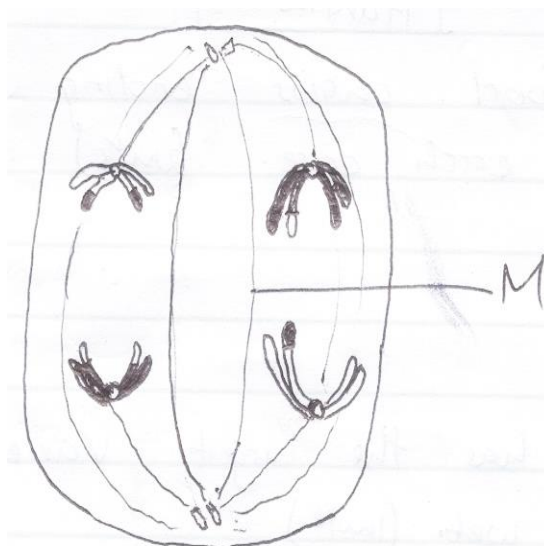


At the end of experiment

- a) Account for shape of the cell at the end of the experiment. (2marks)
 - b) Draw a diagram to illustrate how a plant cell would appear if subjected to the same treatment. (1mark)
16. a) Define the term resolution as used in microscopy. (1mark)
- b) A student observed a specimen through a light microscope. He used the objective lens marked x40. If he indicated the magnification of the image as x400, what was the eye piece magnification. (Show your working) (3marks)

.....
.....
17. Explain why plants do not require specialized excretory organs. (4marks)

.....
.....
.....
.....
18. The diagram below represents a stage during cell division.



a) i) Identify the stage of cell division. (1mark)

.....
ii) Give **two** reasons for your answer in a(i) above. (2marks)

.....
b) Name the structures labeled M. (2marks)

.....
19. State **two** causes of Air pollution. (2marks)

.....
20. a) The action of ptyalin stops at the stomach. Explain. (1mark)

.....
b) State **one** factor that denatures enzymes. (1mark)

.....
c) Name the feature that increase the surface area of small intestines. (1mark)

.....
21. a) State **two** differences between complete and incomplete metamorphosis. (2marks)

.....
b) State the importance of moulting to an insect. (1mark)

.....
22. Name a method that could be used to estimate the population size of the following organisms.

i) fish in a pond. (1mark)

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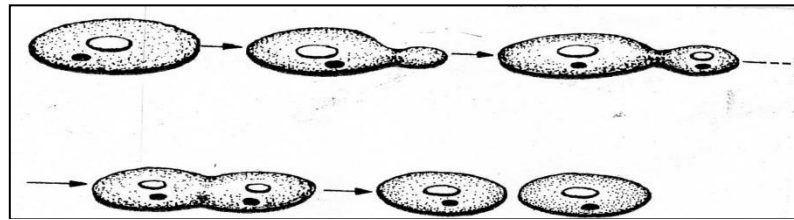
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.....
ii) Black jack in a garden. (1mark)
.....

23. State three environmental factors that affect;
a) The rate of transpiration in plants. (3marks)
.....
.....
.....

b) Give a reason why some Xerophytic plants have needle-like leaves. (1mark)
.....

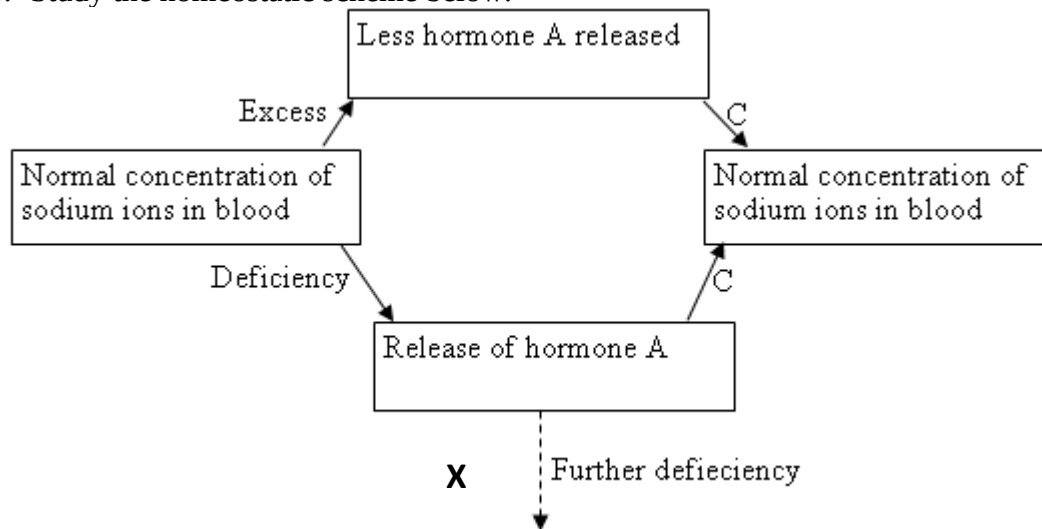
24. The diagram below represent a biological process in yeast cells.



a) Name the process occurring. (1mark)
.....

b) State the economic importance of organism shown above. (2marks)
.....
.....
.....

25. Study the homeostatic scheme below.



a) Identify the hormone labeled A. (1mark)
.....

b) Which gland releases hormone A. (1mark)
.....

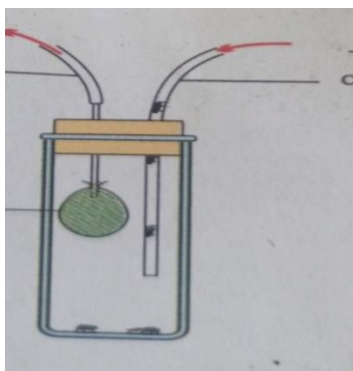
c) Identify a site of action of hormone A. (1mark)
.....

SERIES 11

1. Identify a characteristic in living organisms illustrated in the diagram below. (1mk)



.....
2. The apparatus below is used in collection of specimen used in a biological study. Study it and answer the questions that follow.



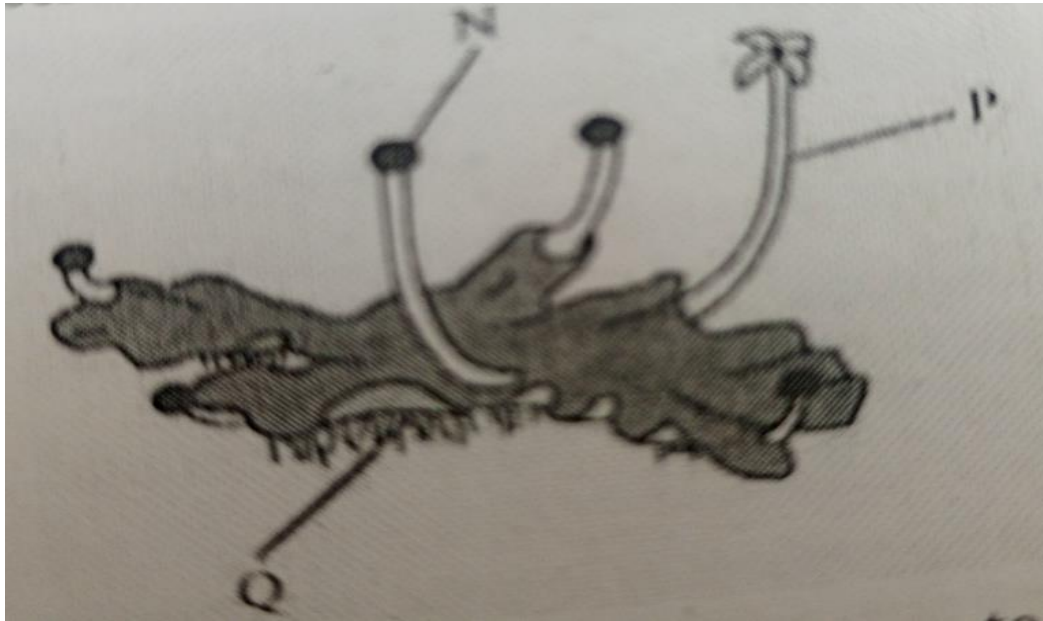
(a) Identify the apparatus illustrated above (1mk)

.....
(b) State the role of the apparatus named in (a) above (1mk)

.....
3.(a) Define the term species (1mk)

.....
(b) Give a reason why a leopard and a lion cannot breed yet they belong to the same Genus. (1mk)

4.The photograph below represents a plant in a certain division.



(a) Name the division to which the plant belongs. (1mk)

.....

(b) With reference to the photograph state two observable features of the division named in (a)above (2mks)

.....
.....

© explain how the part labelled Q is adapted to its function. (1mk)

.....
.....

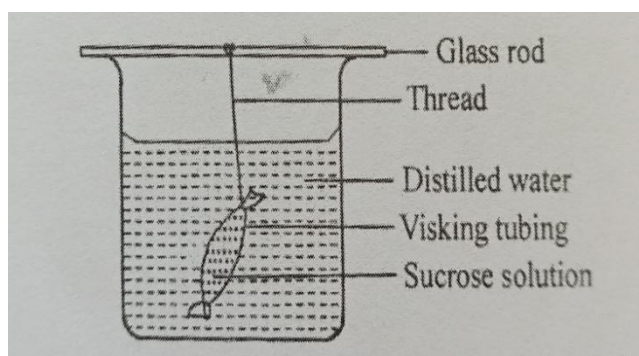
5. Give a reason why only the fine adjustment knob should be used when using high power objective /coarse adjustment knob should not be used to lower the high power objective lens. (1mk)

.....
.....
.....

6.Giving a reason ,name the cell organelle abundant in Skeletal muscle (2mk)

.....
.....

7.Study the setup below and answer the questions that follow.



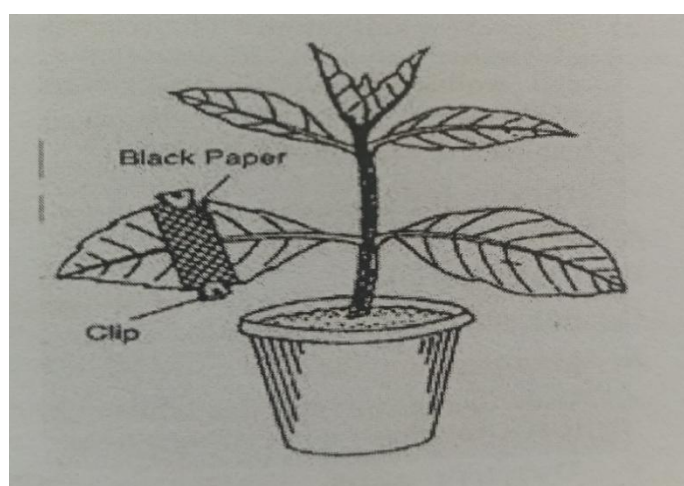
(a) Name the process that is being investigated (1mk)

.....
(b) State the expected observations after the setup is left for 3 hours. (2mks)

8. (a) Distinguish between Plasmolysis and Haemolysis (2mks)

.....
(b) What is the significance of diffusion in pollination ? (1mk)

.....
9. Students of Gikumene secondary school set up an experiment to investigate whether light is necessary for photosynthesis. It was then left in the dark for 48 hours. Study it and answer the questions that follow.



(a) Why was the plant kept in the dark for 48 hours? (1mk)

- (b) Why was it necessary to transfer the plant to light. (1mk)
-
- (c) What was the role of lightproof paper? (1mk)
-
- 10.State two examples of polysaccharides. (2mks)
-
- 11.Explain how the mouth is adapted to its functions. (3mks)
-
-
- 12.State three factors determining energy requirements in humans (3mks)
-
-
-
13. A certain animal was found to have the following number of teeth on the upper jaw;6 Molars,6 Premolars,no canines and 4 incisors were found.
- (i) Write the dental formula of the above animal. (2mks)
-
- (ii) What is the likely diet of the animal? (1mk)
-
- 14.Name three structures for transpiration in plants. (3mks)
-
- 15.What is the importance of Lignin in xylem vessels (1mk)
-
- 16.Name two nerves that control the heartbeart (2mks)
- 17.A doctor performing an operation cut two blood vessels by mistake.He notices that from one of the blood vessels,blood sputrs out while from the other ,blood flows out steadily.
- (a) Identify the type of each blood vessel in which ;
- (i) Blood spurts out (1mk)
-

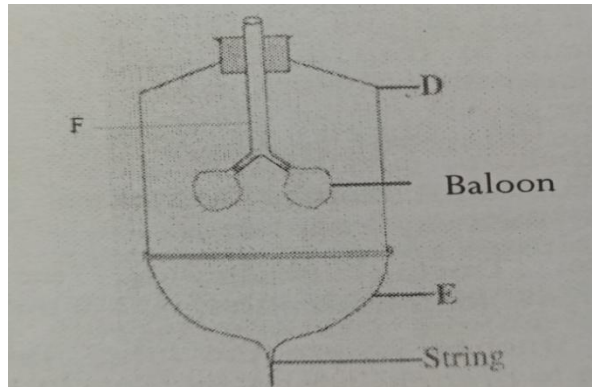
(ii)Blood flows smoothly

(1mk)

(b)Give a reason for your answer in (a) above

(2mks)

18.The diagram below represents a model used to demonstrate breathing in mammals.



(a) Name the mammalian structure represented by the parts labelled D and E. (2mks)

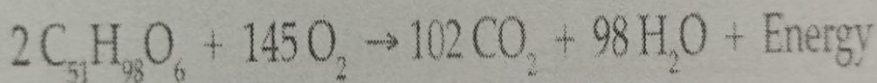
(b) State the observation made when the string is pulled downwards.

(1mk)

(c) Explain the observation in (b) above

(2mks)

19.Study the equation below .



(a) Calculate the RQ.

(2mks)

(b) State the type of substrate used

(1mk)

(c) State the type of respiration that took place and give a reason. (2mks)

20.Distinguish between **test cross** and **back cross** as used in Genetics (2mks)

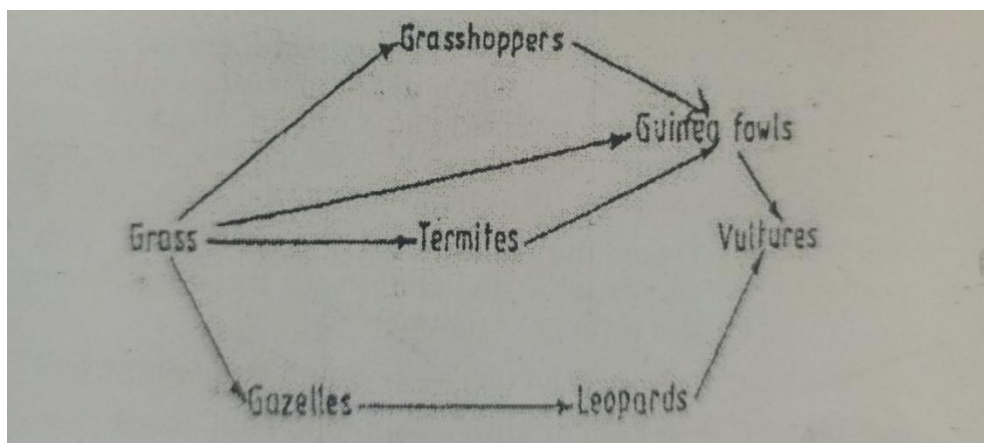
21. In rats ,the allele for black fur is dominant over the allele for brown fur. What percentage of offsprings would have black fur from a cross between a heterozygous black rat and a brown rat?Let B represent the gene for black fur.(show your working using a genetic cross) (5mks)

22. Name two examples of sex-linked disorders linked on the x chromosomes. (2mks)

23.Give two reasons why plants lack complex excretory organs. (2mks)

24.Name three structures of the skin essential for its homeostatic functions (3mks)

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



(a) Construct two food chains in which the guinea fowls are secondary consumers (2mks)

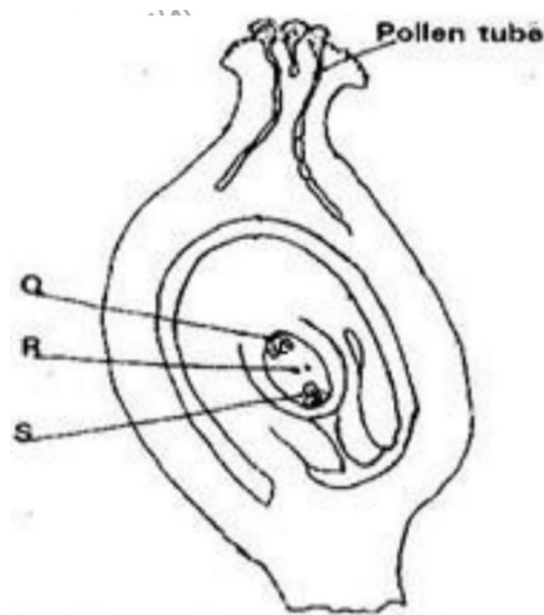
(b) What would be the short term effects on the ecosystem if lions invaded the area? (2mks)

26.Name three structures that wither after fertilization

(3mks)

.....
.....

27.The diagram below shows a stage during fertilization in flowering plants.



(a) Name the parts labelled

(3mks)

Q.....

R.....

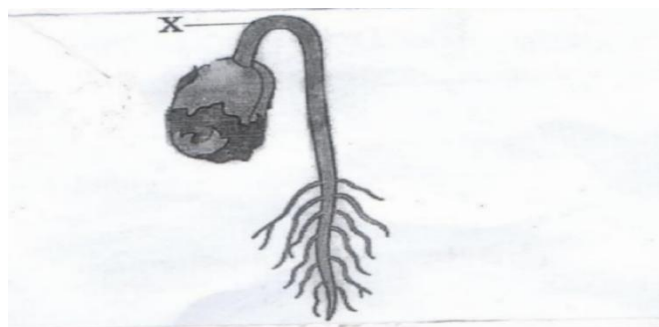
S.....

(b) State the function of the pollen tube

(1mk)

.....

28.The diagram below represents a stage during germination of a seed.



(a) Name the type of germination illustrated in the diagram

(1mk)

.....

(b) State the role of the part labelled X during germination of the seed.

(1mk)

.....

29.State two characteristics of meristematic cells

(2mks).

SERIES 13

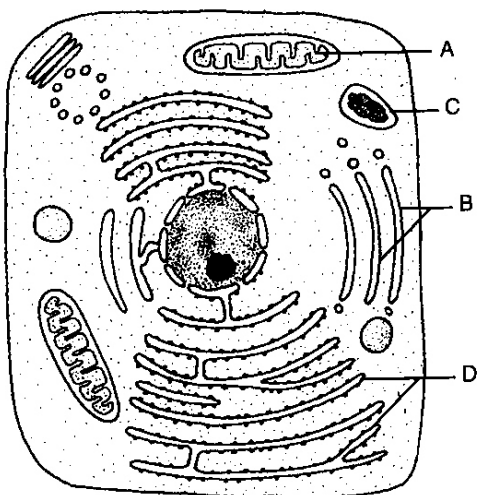
1. Distinguish between anatomy and morphology. (2mks)

Anatomy	Morphology

2. State the characteristics of living things that is being demonstrated by seeds producing heat during germination (1mk)
3. a) During a field study. A form one student at kabai School observed the organism below. Name one appropriate tool the student would use to collect the specimen. Give a reason for your answer. (2mks)

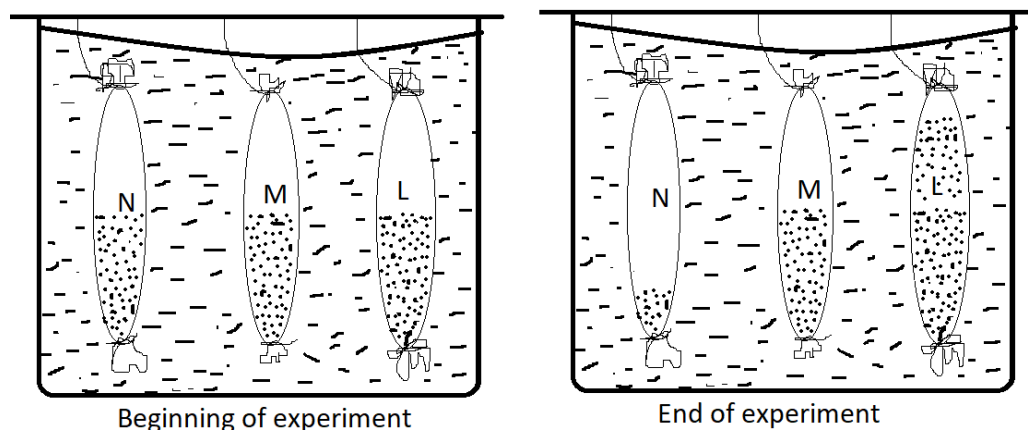


- b) State three precautions the students should take during the collection of the above specimen. 3mks
4. The diagram below represents a cell as seen under an electron microscope.



- a) Identify the parts labeled A and D. (2mks)
- b) State the function of the structures found on the part labeled D. (1mk)

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

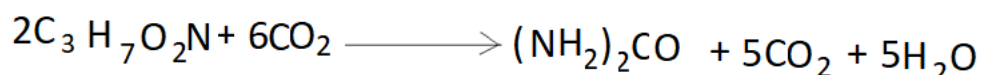


- (a) Which process was being investigated. (1mk)
- (b) State the nature of solution M and L as compared to the 5% sugar solution in the beaker. (2mks)
- (c) Account for the results obtained in visking tubing N. (3mks)
6. a) Name one process that brings about
- The translocation of manufactured food in plants. (1mk)
 - Transport of water from the epidermal cells of the root to the cells at the center of a monocotyledonous root. (1mk)
 - Absorption of soluble products of digestion from the alimentary canal into the blood stream. (1mk)
7. The following is the dental formula of a certain mammal.
- $$i \frac{0}{3} \quad c \frac{0}{1} \quad pm \frac{3}{3} \quad m \frac{3}{3}$$
- (a) (i) State the likely mode of feeding for the mammal. (1mk)
- (ii) Give a reason for your answer in (a)(i) above. (1mk)
- (b) Explain how the carnassial teeth of a carnivore are adapted to their function. (2mks)
8. A patient with blood group A was involved in a road accident and required urgent blood transfusion. His relatives were invited to donate blood.
- (a) Name the compatible blood groups. (2mks)
- (b) State why other blood groups were not compatible (1mk)

9. Most carbon (IV) oxide is transported from tissues to the lungs within the red blood cells and not in the blood plasma. Give two advantages of this mode of transport. (2mks)
10. Name three forces involved in transportation of water and mineral salts up the stem (3mks)
11. State three differences between anaerobic and aerobic respiration (3mks)

Anaerobic	Aerobic

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

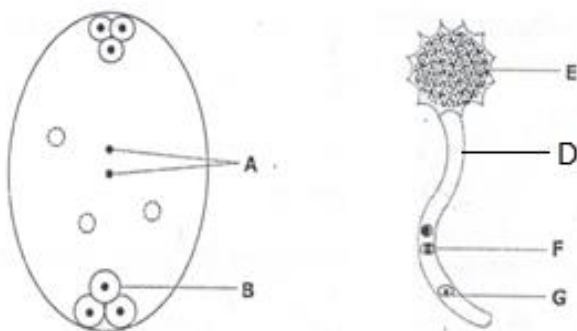


- (a) Calculate the respiratory quotients [RQ] of the food substance. (2mks)
- (b) Identify the food substrate (1mk)
13. State the function of the following in mammalian trachea. (3mks)
- a) Rings of cartilage
 - b) Mucus
 - c) Cilia.
14. a) Name the fluid that is produced by sebaceous glands. (1mk)
- (b) What are the roles of sweat on the human skin? (2mks)
15. In an investigation, equal amounts of water was placed in three test tubes labelled J, K, and L. Pond weeds of equal length were dropped in each test tube. The test tubes were then placed in identical conditions of light and carbon (IV) oxide at different temperatures for five minutes. After five minutes, the bubbles produced in each test tube were counted for a minute. The results were as shown in the table below.

Test tube	Temperature(°c)	Number of bubbles.
J	20	28
K	35	42
L	55	10

- (a) Name one requirement for this process that is not mentioned in the investigation. (1mk)
- (b) Name the gas responsible for the bubbles produced. (1mk)
- (c) Account for the results in test tubes K and L (2mks)

16. (a) A student collected an organism and observed the following features: Simple eyes, four pairs of legs and two body parts.
- State the class to which the organism belongs. (1mk)
 - Give an example of an organism in this class. (1mk)
- (b) Name the kingdom to which plasmodium belongs. (1mk)
17. What happens to excess fatty acids and glycerol in the body. (1mk)
18. Name two tissues in plants which are thickened with lignin. (2mks)
19. Name the part of a flower that develops into:
- Seed (1mk)
 - Fruit (1mk)
20. The diagrams below show changes in the life cycle of flowering plants.



Complete the table below by choosing the letters from the diagram which refers to each of the given structure. (4) marks

STRUCTURE	LETTER
Pollen tube	
Tube nucleus	
Egg cell	
Male gamete nucleus	

21. Name the causative agent of the following diseases. (2mks)
- Trichomoniasis.

(b) Amoebic dysentery

22. (a) What is the relationship between leguminous plants and bacteria found in their roots. (1mk)

(b) Give two reasons why primary productivity in an aquatic ecosystem decreases with depth. (2mks)

23. State one survival value for each of the following in plants.

(a) Thigmotropism in stems. (1mk)

(b) Geotropism in roots. (1mk)

24. a) Give two sex linked genes found on the Y-chromosome. (2mks)

b) Below is a nucleotide strand

A	A	G	T	C
---	---	---	---	---

i) Identify the type of nucleic acid. (1mk)

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

25. (a) What are vestigial structures. (1mk)

(b) Name a vestigial structure in human beings. (1mk)

26. (a) Name the evidence of organic evolution exhibited by occurrence of similar amino acid molecules in a range of organisms. (1mk)

(b) Why are some bacteria able to resist the effect of antibiotics. (2mks)

27. (a) Name the type of skeleton that makes up each of the following animals

(i) Locust – (1mk)

(ii) Bird – (1mk)

(b) Name the fin(s) in tilapia fish responsible for the following: (2mks)

(i) Steering

(ii) Pitching

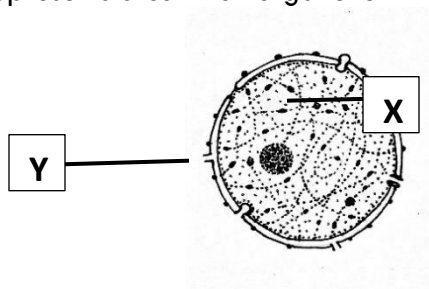
1. a) State the main importance of a lens in a light microscope (1mk)

.....

.....
- b) Why is the electron microscope said to be safer to the eyes than light microscope?

.....

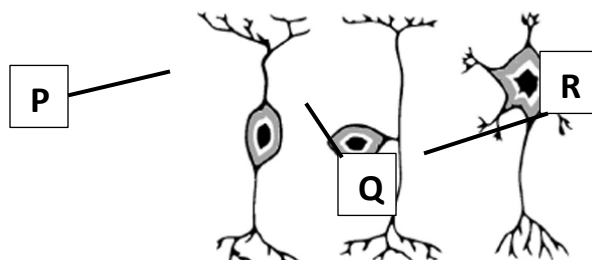
.....(1mk)
2. The diagram shown below represents a common organelle



- a) Name a Kingdom that: (2mks)
 - i. Has structure X
 - ii. Lacks Structure X
- b) How is structure Y important in growth and development of organisms? (2mks)

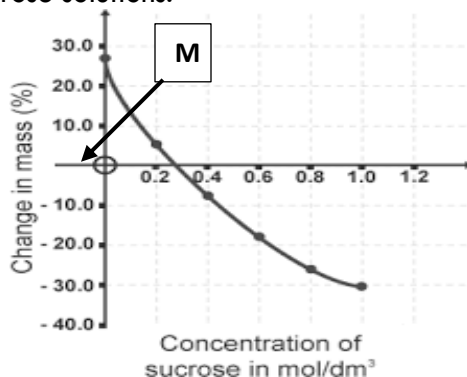
.....

.....
3. Use the diagrams of nerve cells shown below to answer the questions that follow



- a) Which letter represents a nerve cell that: (2mks)
 - i) Has its cell body outside the grey matter of CNS
 - ii) Transmits impulse to effector muscles
- b) Arrange the letters in sequence to show a reflex arc(1mk)

.....
4. The following is a graph representing results of an investigation on a physiological process when potato strips were placed in different sucrose solutions.



- a) Explain why the concentration at M is the normal cell sap concentration of potato cells used in the experiment (2mks)

.....
.....
b) Why is there no further change in weight at 1.0mol/dm³ sucrose concentration? (1mk
.....
.....

c) Give **TWO** conditions necessary for osmosis to take place (2mks
.....
.....

5. State **THREE** evolutionary features that make human beings to be more developed than the other living organisms (3mks
.....
.....
.....

6. A dwarf garden pea plant was crossed with a tall garden pea plant and all the off springs were tall.

a) Why was there no dwarf offspring? (1mrk
.....
.....

b) Write the genotype of the off-springs using letter d for the gene for dwarfness(1mrk
.....
.....

7. a) Name the part of chloroplast where light-independent reactions take place 1mk
.....
.....

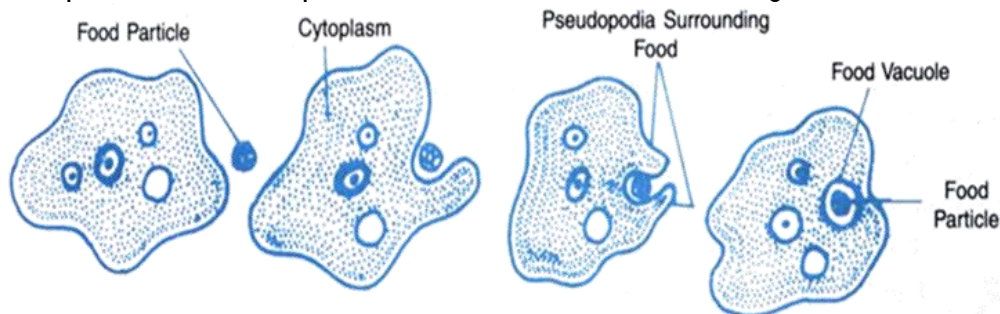
b) State the importance of light-dependent photosynthetic reactions to:

i) Animals (1mk
.....
.....

ii) light-independent photosynthesis phase (2mks
.....
.....

8. Samwel observed the image of an onion epidermal cell with a diameter of 300micrometers under a light microscope using X15 eye piece lens and X40 objective lens. Determine the actual diameter of the onion cell (3mks
.....
.....
.....

9. The following is a process that takes place in some cells and unicellular organisms



a) Identify the process shown above (1mk
.....
.....

b) Which human white blood cell is capable of the activity named in a) above? (1mk
.....
.....

c) Which other way does the white blood cell fight pathogens in addition to the method shown above? (1mk
.....
.....

10. Name the micro-organisms that cause the following diseases

(2mks)

a) Bilharzia

.....

b) Amoebic dysentery

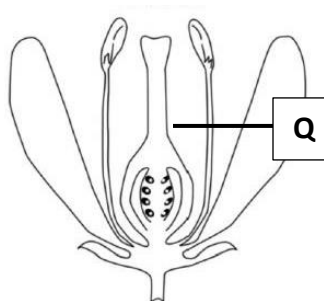
.....

11. Give differences of the endoplasmic reticula in terms of the following features

(2mks)

Feature	Smooth Endoplasmic Reticulum	Rough Endoplasmic Reticulum
Structure		
Function		

12. The following is an illustration of a flower



a) State **TWO** ways part **Q** helps encourage pollination by insects

(2mks)

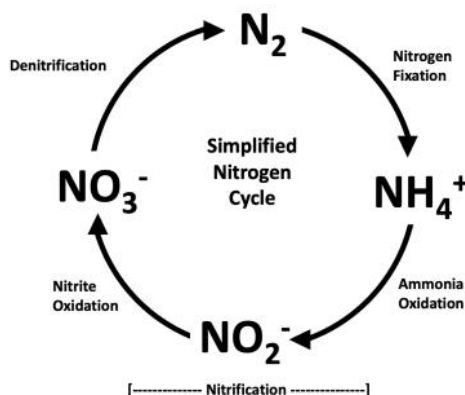
.....

b) Give **TWO** features which promote self-pollination in the flower shown above

(2mks)

.....

13. The following is a simplified Nitrogen Cycle



a) Explain why denitrification is disadvantageous to plants

(1mk)

.....

b) Name the bacteria found at the following stages of the cycle

(2mks)

i) Nitrogen fixation

.....

ii) Nitrification

.....

14. a) Name an enzyme that is important in the transport function of red blood cell

(1mk)

.....

b) Give **TWO** adaptations of the red blood cell that arise from its external appearance

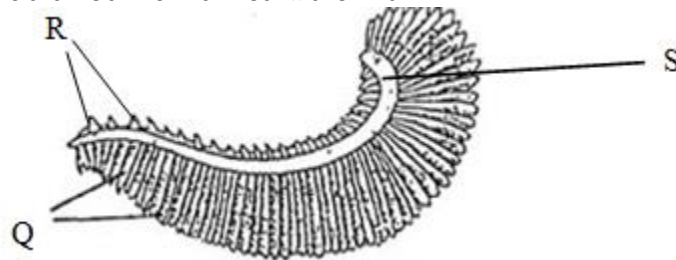
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.....

(2mks

15. The following is an organ obtained from a freshwater fish



- a) State the function of the organ (1mk

 b) Name the parts labelled **Q** (1mk

 c) State the importance of parts **R** and **S** to function of part labelled **Q** (2mks
 i) **R**

 ii) **S**

16. Differentiate between homozygote and heterozygote cells (2mrks

17. Use the following images of living organisms to answer the questions that follow



V



W



X

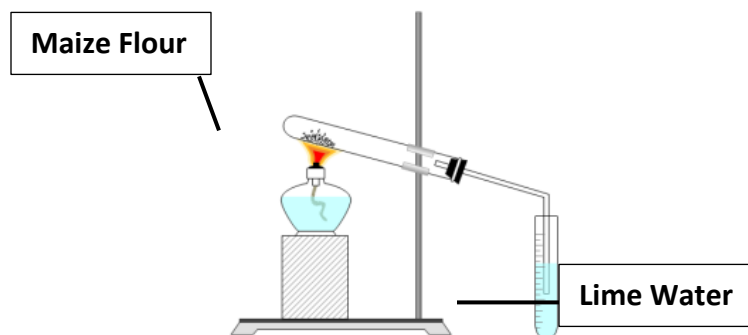
- a) Why is it that Organism **V** belongs to Class Arachnida? (1mk

 b) Develop a two-stage dichotomous key to identify the organisms above using the following features: (4mks
 1. Wings
 2. Antennae

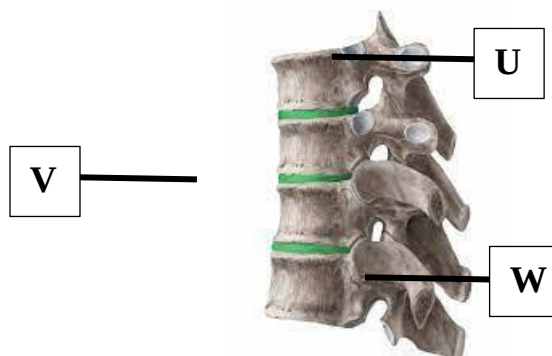
18. a) State **TWO** ways change in body color of a chameleon is important for its survival

(2mks
 b) State **TWO** conditions necessary for competition to exist in an ecosystem (2mks

19. a) Name the endocrine tissue found in the Pancreas. (1mk)
-
- b) Explain the role of the tissue named in a) when sugar level rises above normal (2mks)
-
-
20. Wanjiku placed little maize flour in a boiling tube and heat it for 6 minutes as shown below

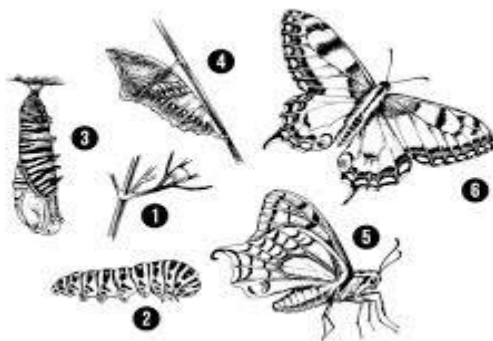


- a) What was the aim of the experiment? (1mk)
-
- b) State the expected observation in the lime water (1mk)
-
- c) Explain the importance of the human body to continuously expel the investigated gas? (2mks)
-
21. a) A 60cm long fish was found to measure 25cm from the head to the anus. Calculate the tail power of the fish (2mks)
-
- b) Periodically, fishermen around rivers do observe migration of fish against the water currents to seek freshwater as their breeding grounds. Name the response exhibited by the fish (1mk)
-
22. The following illustration represents a section of the thoracic vertebra



- a) Which letter represents a part that articulates with the rib? (1mk)
-
- b) Give **TWO** functions of part labelled **V** (2m s)
-
-

23. Use the illustration of the development cycle of an insect below to answer questions that follow



a) Name the hormone responsible for the changes observed above 1mk

.....

b) Give **TWO** Reasons why stages **2** and **5** occupying different niches is important for the survival of the butterfly. (2mks)

.....

24. In an experiment, Substance **Q** was mixed with iodine solution, and it gave a blue-black color. **Q** was then maintained in a solution containing Enzyme **K** for 15minutes at 37°C and formed Substance **J** which when boiled with reagent **Z** gave a brick red color.

a) Give the identity of the following: (2mks)

i) Enzyme **K**

ii) Reagent **Z**

b) i) State **ONE** property of **J** (1mk)

.....

ii) Why was the temperature maintained at 37°C ? (1mk)

.....

c) Account for the color to be observed when Substance **Q** is reacted with Enzyme **K** in the presence of dilute Hydrochloric acid and Reagent **Z** added?

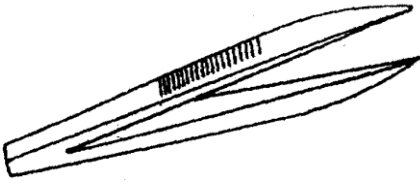
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.....

.....(2mks)

SERIES 15

1. Identify the apparatus represented by the diagram below and state its function,



- (i) Name (1 mark)
 (ii) Function (1 mark)

2. i) With reference to circulatory system only give **two** reasons why birds and mammals are more active compared to other organisms? (2 marks)

.....

ii) State **two** differences between open circulatory system and closed circulatory system (2 marks)

.....

3. Explain why a pregnant woman excretes less urea compared to a woman who is non-pregnant. (2 marks)

.....

4. a. State **two** features of the placenta which speed up the exchange of materials between the mother and the foetus. (2 marks)

.....

b. Name the **two** hormones involved in regulation of the menstruation cycle. (2 marks)

5. State the role of the liver in each of the following processes

(a) Digestion (1 mark)

.....

(b) Excretion (1 mark)

.....

6. (a) State one way in which human body is naturally protected against harmful bacteria. (1 mark)

.....

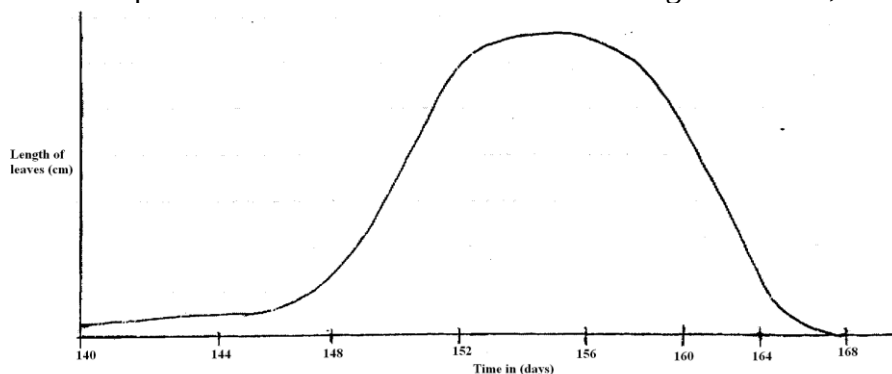
(b) State two ways in which the composition of blood in the pulmonary artery and that of pulmonary vein differ. (2 marks)

.....

7. Construct a possible food chain for the crocodile, fish, algae and mosquito larvae found in an aquatic ecosystem (2 marks)

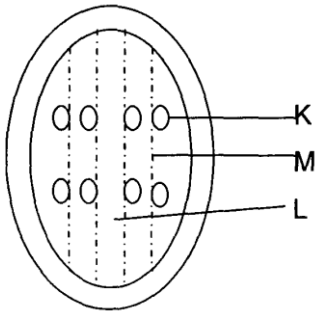
8. Plants relatively have less waste to excrete than animals. Give two reasons to explain this observation. (2 marks)

9. A strand of a DNA molecule was found to have the following base sequence.
C -G -A -T -G -T
- (a) What is the sequence on m-RNA strand copied from this DNA portion? (1mark)
- (b) Write the Complementary DNA strand from the above DNA portion (1mark)
- (c) State **two** roles of DNA molecule. (2 marks)
10. a) Name the gaseous exchange structure in woody stems. (1mark)
- (b) State **two** adaptations of xylem vessels their functions (2marks)
11. Name the type of carbohydrates (polysaccharides) found in the following parts of living Organisms. (3 marks)
- (i) In the exoskeleton of arthropods
- (ii) In the xylem vessels
- (iii) In the animals blood
12. In an experiment to observe some variation in length of leaves, the following curve was obtained.



- (a) Identify the type of variation illustrated by the curve. (1mark)
- (b) State two meiotic processes that cause variations (2marks)

13. The diagram below represents a chloroplast.



- (a) Name the parts labeled M and L.

M (1mark)

L (1mark)

- (b) Describe the process that takes place in the structure labeled K. (3marks)

.....

.....

14. a) Name the other transport system in animals other than blood circulation system. (1 mark)

.....

.....

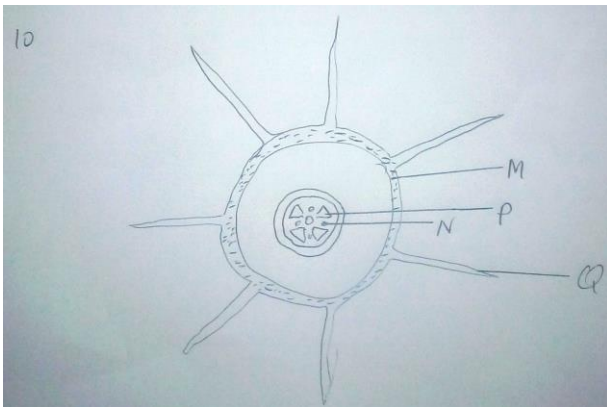
- (b) Distinguish between natural acquired artificial immunity and acquired immunity.(2marks)

.....

.....

.....

15. The diagram below represents a transverse section through a plant organ. Study it and answer the questions that follow.



- (a) From which plant organ was the section obtained. (1 mark)

.....

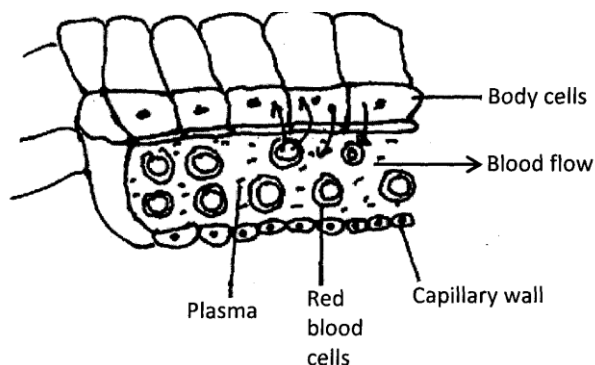
- (b) Name the parts labeled Q, N and P. (3 marks)

Q -

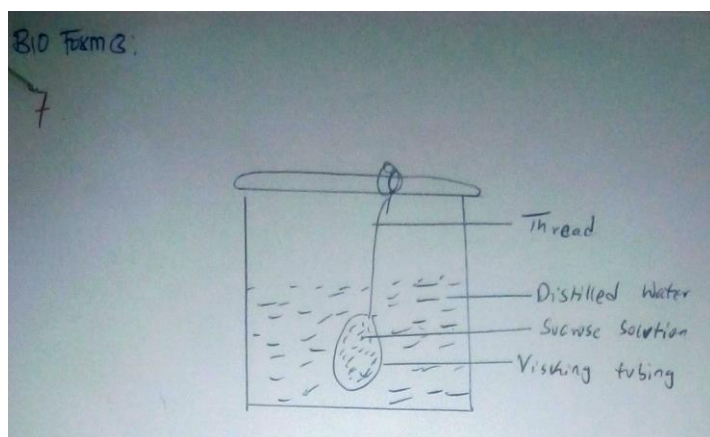
N -

P -

16. The diagram below shows gaseous exchange in mammalian tissues.



- (a) Name the gas that diffuses;
- To the body cells..... (1mark)
 - From body cells.....(1mark)
- (b) Which compound dissociates to release the gas named in (a) (i) above (1mark)
-
-
17. State two classes of the phylum Chordata where all members are endothermic. (2 marks)
-
-
-
18. Give three adaptations of animals dispersed fruits and seeds. (3 marks)
-
-
-
-
-
19. An experiment was set up as shown below. Study it and answer the questions that follow.



- (i) The set up was left for 20 minutes. State the expected results. (1 mark)

.....

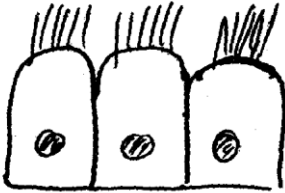
- (ii) Explain your answer in (i) above. (2marks)

20. (a) What is the role of antidiuretic hormone in osmoregulation ? (1mark)

(b) Explain why under normal circumstances, glucose is absent in urine yet it is present in the glomerular filtrate. (2marks)

21. Explain what happens in humans when the concentration of glucose in the blood rises above the normal level. (3marks)

22. The diagram below shows a type of epithelial tissue.



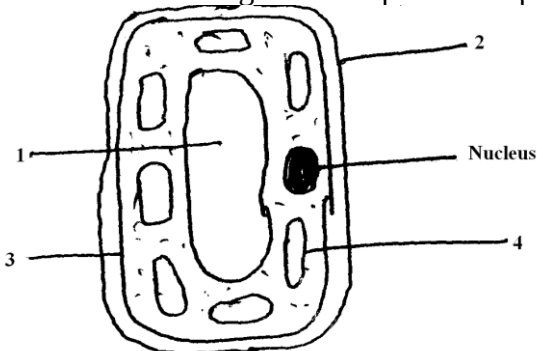
(a) Name the hair- like structures. (1mark)

(b) What is the function of the hair – like structures? (1mark)

(c) Name **two** mammalian organs where this type of epithelium is found. (2marks)

23. In what ways are the gill filaments of a fish adapted to their function? (2 marks)

24. Below is a diagram of a specialized plant cell.



(a) Identifying the specialized cell (1mark)

.....

(b) State the function of each of the following cell organelles

(i) Golgi bodies (1mark)

.....

(ii) Lysosomes (1mark)

.....

25. Explain how **fossil records** serves as evidence for evolution. (2 marks)

.....

26. (a) Name an organ in which meiosis occurs in : (1mark)

(i) A flowering plant

.....

(ii) A mammal. (1mark)

.....

(b) (i) Name the stage of meiosis during which sister chromatids separate (1mark)

.....

(ii) What is the importance of crossing over in living organism? (1mark)

.....

27. Explain the effects of the following on the quantity and composition of urine.

(a) Drinking large amount of clean water (1mark)

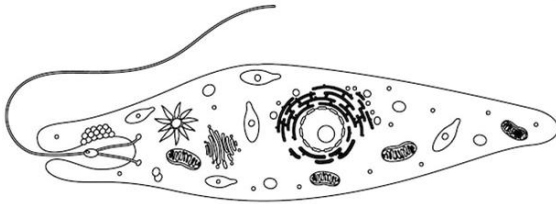
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(b) Removal of pancreas (1mark)

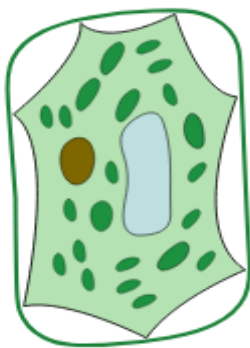
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Answer all the questions in the spaces provided.

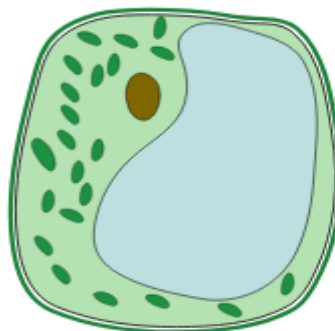
1. Name any two branches of microbiology. (2marks)
2. Which biological tool would a scientist require to collect rats to be used for study? (1mark)
3. When are two organisms considered to belong to the same species (2marks)
4. The diagram below represents an organism



- a) Name the kingdom to which the organism belongs. (1mark)
- b) Suggest the habitat in which the organism lives. (1mark)
- c) Give two reasons for your answer. (2marks)
5. State two unique characteristics of Chordate not found in another Phylum. (2marks)
6. Shieko sec school biology student used a microscope with X40 objective lens and X5 eye piece lens which had 2mm radius. Calculate the area of the field of view in micrometers. (2marks)
- b) What is the average size of the cell in micrometers if there were 5 cells on the field of view(2marks)
7. The cells shown below were obtained from two different plant cells which were immersed in 2% and 25% salt solutions



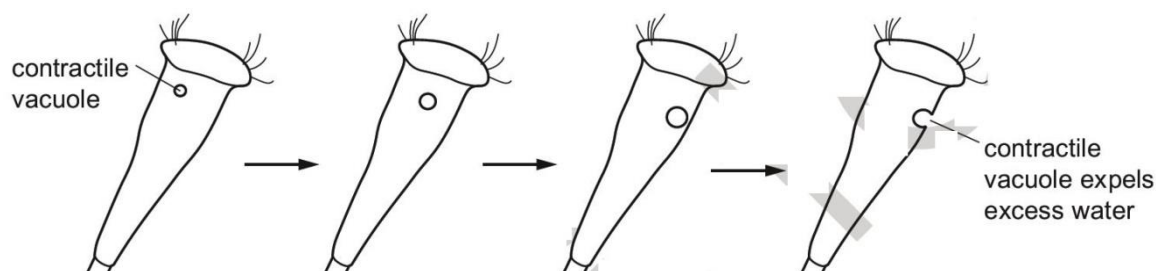
A



B

8. (a) Which of the two cells **A** and **B** was immersed in 2% salt solution? (1mark)
- (b) Comment on the nature of 25% salt solution in relation to the cell sap. (1mark)
- (c) What biological phenomenon leads to the observation made in **A**. (1mark)
9. a) If pepsinogen and trypsinogen were produced in their active forms, what would be their effects on the alimentary canal. (1mark)
- b) How else is the alimentary canal protected from the effects stated in a) above. (1mark)

10. In an investigation, the pancreatic duct of a mice was blocked by tying it with a string. Explain how this affected the digestion of food. (2marks)
11. Examination of the alimentary canal of a mammal showed that the food in the small intestine was more fluid than in the colon. Give an explanation for this observation. (1mark)
12. Name two tissues in plants which are thickened with lignin. (2marks)
13. (a) What is the importance of the following substances in blood clotting process in man?
 (i) Vitamin K. (1mark)
 (ii)Thrombin. (1mark)
 (b) what is the disadvantage of having blood group O. (1mark)
14. Name the part of the seed whose growth brings about epigeal germination. (1mark)
15. a) Differentiate between gaseous exchange and ventilation (1mark)
 b) State the respiratory site of the following. (2marks)
 i)Fish -
 ii) Insect -
16. In an investigation, a bird was found to use 10 litres of oxygen to give a respiratory quotient of 0.7 during period of flight.
 a) Name the type of food that was being respired by the bird. (1mark)
 b) Determine the volume of carbon (IV) oxide produced during the same flight. (2 marks)
17. a) Single-celled Organisms with cell walls do not have contractile vacuoles. Suggest why.(2marks)
 b) *Rhabdostyla* lives in freshwater habitats, such as pond, lakes and rivers where solute concentration is low. *Rhabdostyla* has a contractile vacuole that fills with water and empties at intervals as shown in. The contractile vacuole removes excess water.



Explain, why *Rhabdostyla* needs to remove excess water.

(3marks)

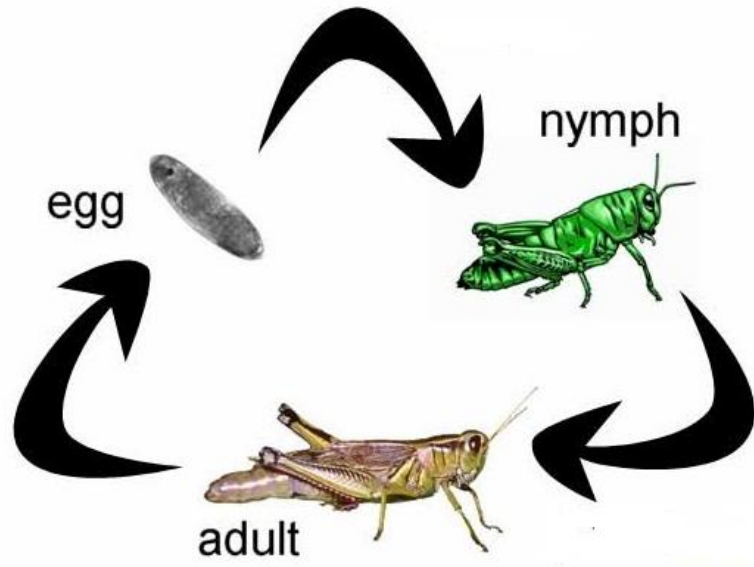
18. Name three plant excretory products deposited in the leaf.

(3marks)

19. State one economic importance of each of the following plant excretory products. (2marks)

- (a) Tannin
- (b) Quinine

20. Study the life cycle shown below and answer the questions that follow.



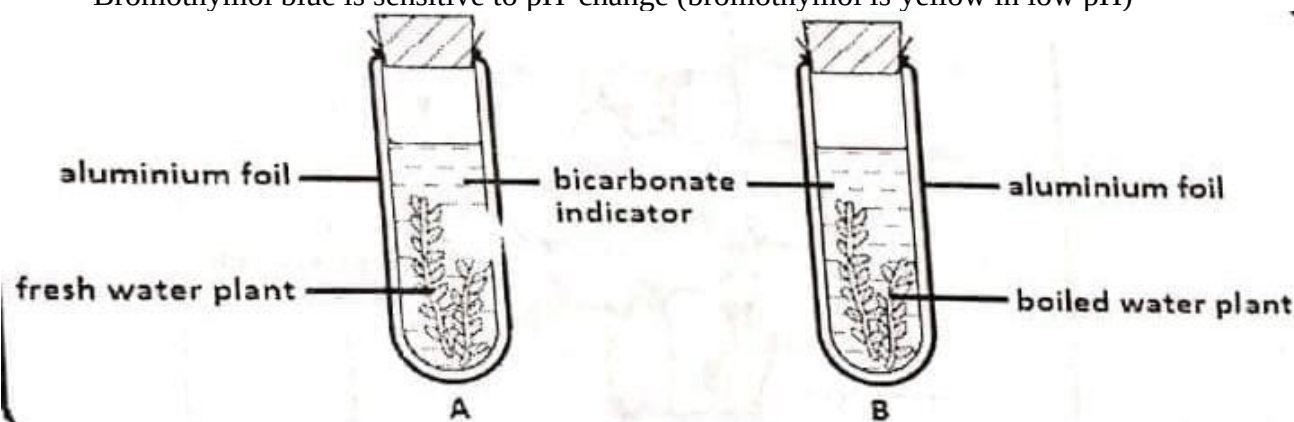
- a) i) Identify the life cycle shown above. (1mk)
 - ii) Give a reason for your answer in ai) above. (1mk)
 - b) Explain how the prothoracic gland is important in the life cycle above. (2mks)
 - c) Name one stage found in the cycle of butterfly but is missing in the above cycle. (1mk)
21. Name the structures in the human body that detect: (2marks)
- (i) External temperature changes.
 - (ii) Internal temperature changes.
22. (a) Name the hormone whose deficiency may lead to the excretion of glucose in urine. (1mark)
- (b) Name the hormone that controls the reabsorption of sodium ions in the kidney tubules. (1mark)
23. Oil can be applied on stagnant water to control the spread of Malaria;
- a) How does this practice control the spread of Malaria (1mark)
 - b) Give a reason why this practice should be discouraged (2marks)
24. a) State two importance of predation in an ecosystem. (2marks)
- b) Apart from predation state two other biotic factors that will influence the distribution of organisms in an ecosystem. (2marks)
25. Mention two causes of genetic variation. (2marks)
26. State two importances of polyploidy. (2marks)

27. a) Pure lines of black and white mice were crossed. All the F₁ generation were grey. Explain the absence of white and black mice in the F₁ generation. (1mark)
- b) Define multiple alleles (1mark)
28. a). State two theories that explains origin of life (2marks)
- b) State three evidences of organic evolution (3marks)
29. a) Explain two limitations of fossil records as evidence of organic evolution. (2marks)
- b) Name the evidence of organic evolution exhibited by occurrence of similar amino acid molecules in a range of organism. (1mark)
30. State the function of the following parts of the eye. (2marks)
- Ciliary body –
- Sclerotic layer –
31. State three ways through which herbaceous stem obtain support. (3marks)

SERIES 17

1. (a) Define the following terms as used in Biology.
- (i) Chemosynthesis (1 mark)
-
-
- (ii) Mutualism (1 mark)
-
-
- (b) State the importance of photosynthesis in nature. (2 marks)
-
-
2. What is the importance of the stroma in the chloroplast? (2 marks)
-
-
3. Name **two** cell structures that synthesize the following cell organelles.
- (a) Ribosomes (1 mark)
-
- (b) Lysosomes (1 mark)
-
4. Name **three** plant leaf excretory products. (3 marks)
-
-
5. A student mixed a sample of urine from a patient with Benedict's solution and boiled the mixture. The colour changed to orange.
- (a) What was present in the urine sample? (1 mark)
-
- (b) What did the student conclude about the health status of the patient? (2 marks)
-
-
- (c) Which organ in the patient may not be functioning properly? (1 mark)
-
6. Name **two** types of valves in the heart. (2 marks)
-
-
7. Sometimes when one stands up very quickly after a long period of sitting, she may feel faint or dizzy. Explain. (2 marks)
-
-
8. The cardiac muscles are said to be myogenic. What is the meaning of the term myogenic. (1 mark)
-
9. A Form 3 student carried out an experimental set up as shown below.

Bromothymol blue is sensitive to pH change (bromothymol is yellow in low pH)



(a) What was the aim of the experiment? (1 mark)

(b) Why was set up B included in this experiment? (1 mark)

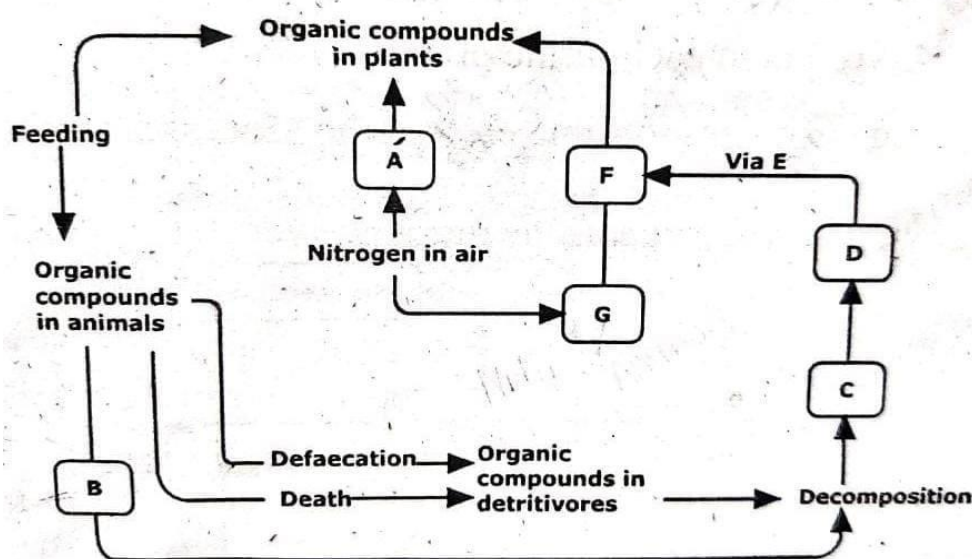
(c) Why was aluminium foil used in this experiment? (1 mark)

(d) Explain why bromothymol changed its colour from blue to yellow in tube A after 30 minutes. (1 mark)

10. Differentiate between the cell wall found in fungi and the one in plants. (2 marks)

11. State **three** adaptations that enable prey to evade predators. (3 marks)

12. The diagram below represents a simplified trend of nitrogen circulation in an ecosystem.

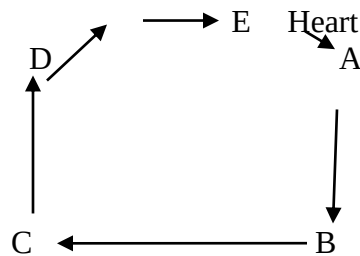


(a) What is the descriptive term applied to each of the organisms A and D. (2mks)

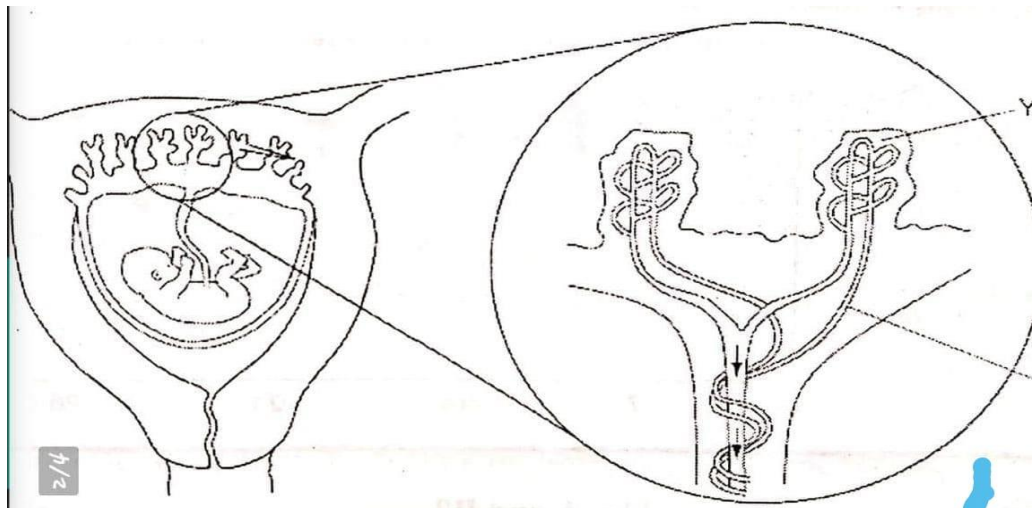
A

- D**
- (b) Name each of the processes. (3 marks)
- (i) Marked **B**
- (ii) Facilitated by organisms **D**
- (iii) One group of organisms that can act as saprophytes
- (c) Name the chemicals **C**, **F** and **E**. (3mks)
- C**
- F**
- E**

13. The diagram below is a summary of the sequence of blood flow through the heart and associated blood vessels.



- (a) Name the blood vessels labelled **A** and **E**. (2 marks)
- A**
- E**
- (b) State **two** differences between blood vessel **B** and **D**. (2 marks)
-
-
-
- (c) State **two** adaptations of the blood vessel labeled **C** to its functions. (2 marks)
-
-
-
14. How does light as a biotic factor influence the distribution of plants in an ecosystem? (3 marks)
-
-
-
15. Seed germination is affected by certain plant growth regulators. Describe **two** actions of gibberellins during seed germination. (2 marks)
-
-
-
16. The diagram below shows a foetus in the uterus.



(a) Name **two** substances that will be at a higher concentration at Y than at X. (2 marks)

.....

.....

(b) State **two** observable adaptations of the placenta to its functions. (2 marks)

.....

.....

17. (a) Name the genetic disorder in humans that is characterized by inability of blood to clot. (1 mark)

.....

.....

(b) A female human was found to have an extra sex chromosome in her cells.

(i) Give the total number of chromosomes in the male individual's cells. (1 mark)

.....

.....

(ii) Explain the possible causes of this condition. (2 marks)

.....

.....

(iii) State **two** physical characteristics observed in the female individual with such a condition. (2 marks)

.....

.....

18. (a) Explain why fossil records as evidence of organic evolution are usually incomplete. (3 marks)

.....

.....

(b) Name the evidence of organic evolution exhibited by occurrence of similar amino acid molecules in a range of organisms. (1 mark)

.....

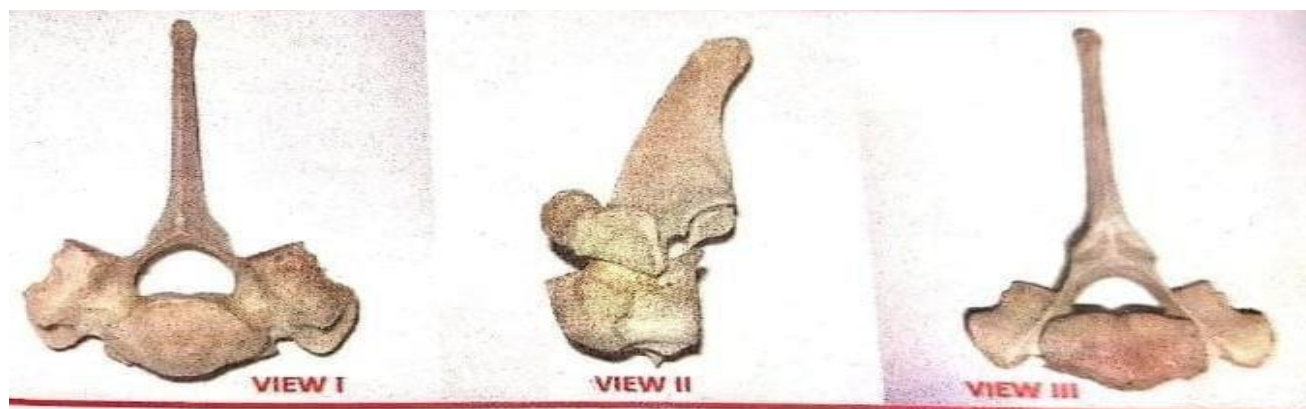
.....

19. Bumble bees are insects that live in the arctic tundra. They have adaptations to keep their body temperature above that of the environment. One adaptation is shivering which involves rapid muscle contraction. A second adaptation is a very hairy body.

Explain how those adaptations help to keep the body temperature above that of the environment.
(3 marks)

.....
.....

20. The photograph below shows a bone from an animal.



(a) (i) Identify the bone shown. (1 mark)

.....
.....

(ii) Give **one** reason for your answer. (1 mark)

.....
.....

(b) Name the body region from which the bone was obtained. (1 mark)

.....
.....

(c) State **three** adaptations of the bone in the photograph to its functions. (3 marks)

.....
.....

21.State the importance of the following parts of a microscope (2mks)

- i) Clip
- ii) Coarse adjustment knob

22.a) Explain why Lamarck's theory of evolution was not accepted by the modern Biologists. (1mk)

.....
.....

b) Distinguish between convergent evolution from divergent evolution. (2mks)

.....
.....

23.State the functions of the following plant tissues (2mks)

a) Collenchyma

b) Sclerenchyma

24 State three ways in which the white blood cells are adapted to their function (3mks)

SERIES 18

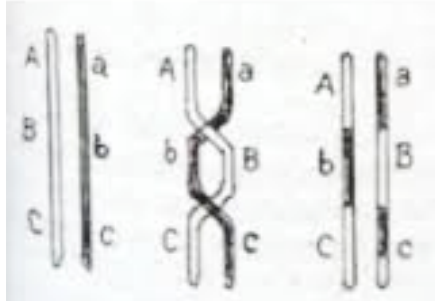
1. a) Define the term Diffusion (1mk)

.....

.....
- b) Give **TWO** conditions required for osmosis to take place between two solutions (2mks)

.....

.....
2. The following diagram represents a process that takes place in some cells



- a) i) Which type of reproduction is represented by the diagram above (1mk)

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

.....
- b) Explain the importance of the process represented above to evolution (2mks)

.....
3. Name the following organisms important in occurrence of Bilharzia disease: (2mks)
 - a) Pathogen
 - b) Vector
4. The following photomicrograph represents interaction between two organisms



- a) i) Name the feeding relationship shown above (1mk)

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

.....

.....

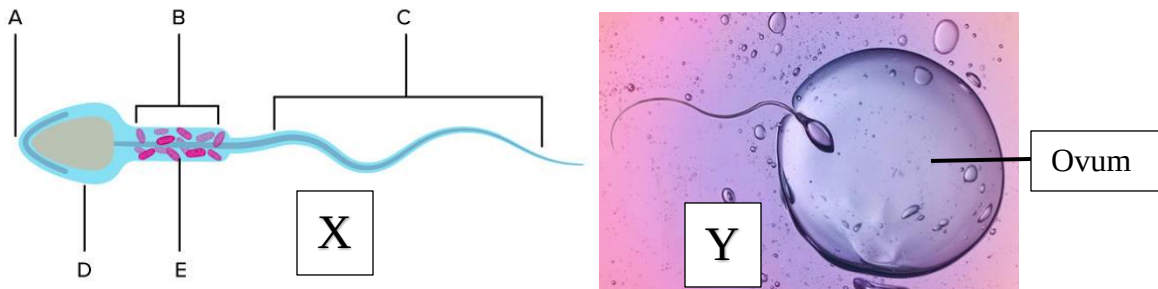
b) Give a reason why the plant represented in the photomicrograph is a dicot (1mk)

.....

.....

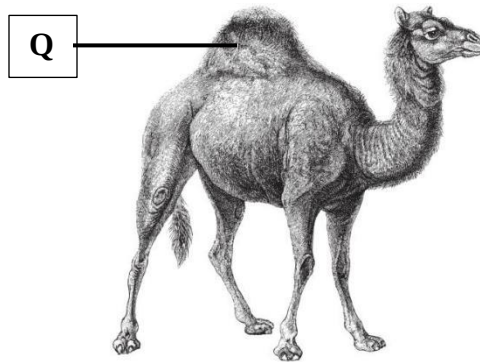
5. a) Name the hormones involved in the following human disorders (2mks)
- i) Diabetes insipidus
- ii) Low Sodium ions concentration in the blood
- b) State ways in which the following organs reduce severity of Diabetes mellitus (2mks)
- i) Kidney
-
- ii) Liver
-

6. Use the diagrams **X** and **Y** shown below to answer questions that follow



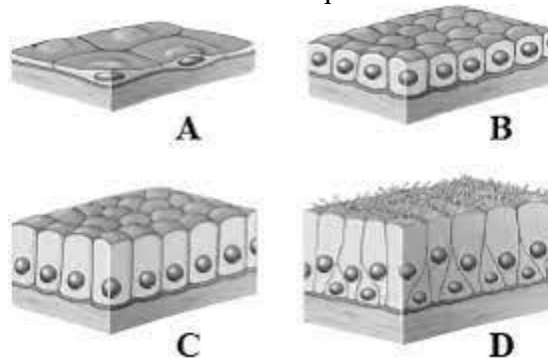
- a) State how the parts labelled **B** and **D** adapt the cell in diagram **X** to swimming
- i) **B**
- (1mk)
- ii) **D**
- (1mk)
- b) i) Name the part of the female reproductive system where the process shown in **Y** takes place (1mk)
-
- ii) Explain how the organelle found in region **A** of the cell shown in **X** facilitates the interaction of cells represented in **X** and Ovum as seen in **Y** (2mks)
-
-

7. James counted 12 cells under a light microscope with a field of view of radius 3mm. Determine the diameter of one cell in micrometers (3mks)
-
-
-
8. The following photograph is of a common travelling animal



- a) Explain how part labelled **Q** adapts the animal to its life in the desert? (2mks)
-
- b) Give a reason why the animal shown above belongs to class Mammalia (1mk)
-
- c) State the expected feature in the kidneys of the animal shown above in terms of the following: (2mks)
- i) Number of nephrons
- ii) Length of Loop of Henle
9. A section of a chromosome was found to have 333 nucleotides. State the number of the following in relation to this section. (3mks)
- a) Number of Nitrogenous bases
- b) Number of codons
- c) Number of Amino acids coded for

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



- a) Name the type of tissue illustrated above (1mk)
-
- b) Why is **A** likely to be found in the mammalian lungs? (1mk)
-
- c) How does tissue labelled **D** adapt the following parts of the human body to their functions
- i) Oviduct (1mk)

.....
.....
ii) Trachea (1mk
.....
.....

11. State **TWO** principles of the Theory of Special Creation in relation to origin of life.

.....
.....
.....(2mks

12. James and Mary made a decision to get married but before that, they approached a qualified medical doctor for genetic counseling.

a) Give **TWO** reasons why this was important (2mks

.....
.....
.....

b) State **TWO** ways the medical doctor did the genetic diagnosis (2mks

.....
.....
.....

13. a) Name the respiratory surfaces in the following organisms (2mks

i. Amoeba

ii. Nile perch fish

b) State the expected structural differences between roots of hydrophytes and those of mesophytes in terms of the following features (3mks

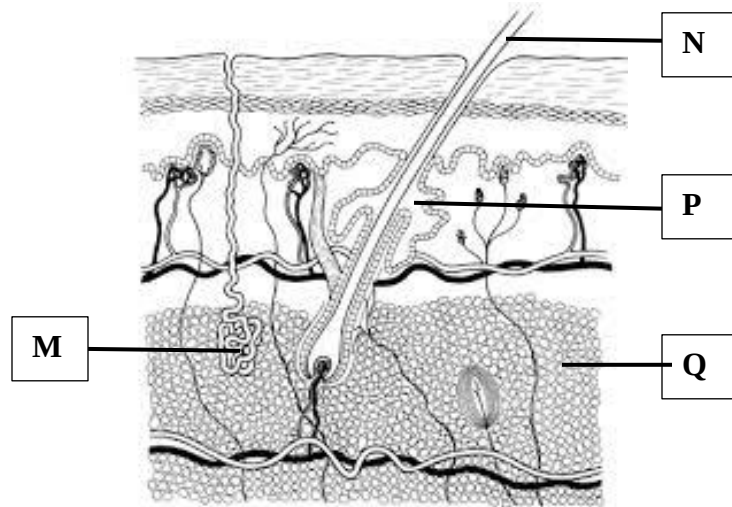
Feature	Hydrophyte	Mesophyte
Type of Roots		
Cuticle		
Root hairs		

14. Name the deficient nutrient in the following disorders (2mks

a) Goitre

b) Scurvy

15. The following diagram is an illustration of the mammalian skin. Use it to answer the questions that follow.



a) Name the muscle important in the functioning of part labelled **N** (1mk

.....

b) State the importance of **P** to the functioning of part **N** (2mks

.....

.....

c) Explain how part **M** helps lower body temperature on a hot day. (2mks

.....

.....

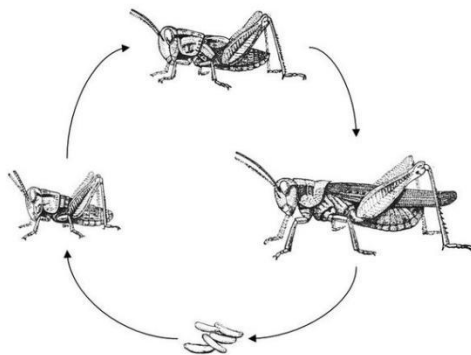
16. Differentiate between the terms community and population as used in ecology. (2mks

.....

.....

.....

17. Study the life cycle shown below and answer the questions that follow.



a) i) Identify the life cycle shown above (1mk

.....

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

.....

.....

b) Explain how the prothoracic gland is important in the life cycle above (2mks)

.....

.....

18. In a metabolic reaction 2 molecules of Oxygen were used to oxidise a food substance and in the process 18 molecules of Carbon (IV) Oxide was released.

a) Calculate the Respiratory Quotient for this reaction (2mks)

.....

.....

.....

b) Give a reason why this reaction represents anaerobic respiration (1mk)

.....

19. a) Give a reason why active immunity is advantageous. (1mk)

.....

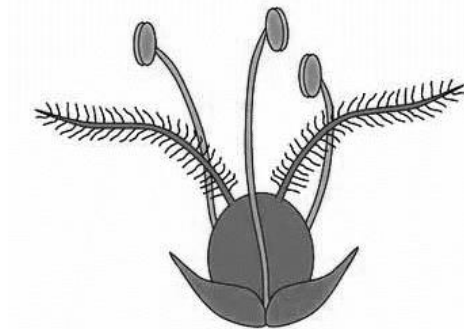
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b) Josephine had an accident leading to damaged tissue and the medical doctors advised for use of autografts but not xenograft for an operation to replace damaged tissue. Explain (2mks)

.....

.....

20. Use the diagram shown below to answer questions that follow.



a) Give **TWO** reasons to show that the flower above is a wind pollinated flower (2mks)

.....

.....

.....

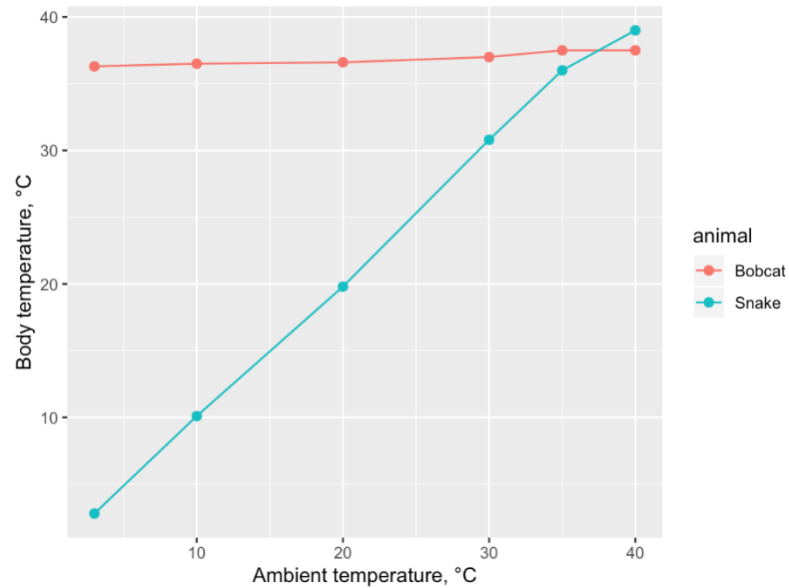
b) State **TWO** significance of seed dormancy (2mks)

.....

.....

.....

21. The body temperature of a bobcat and a snake were studied over time against the ambient/surrounding temperature and plotted as shown in the graph below.



a) Account for the observation shown in the graph (2mks)

.....

.....

b) Give **TWO** disadvantages a snake experiences as a result of the temperature changes shown in the graph above (2mks)

.....

.....

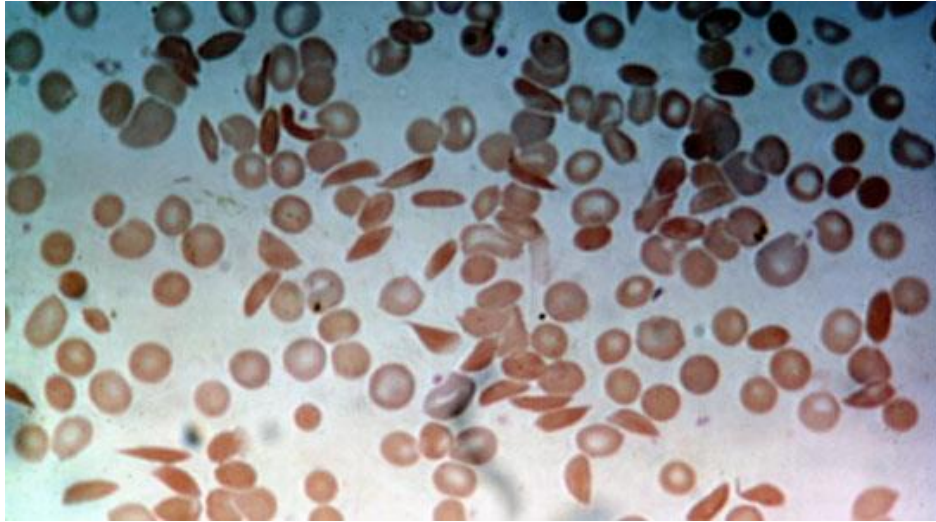
22. Describe the mechanism of stomata opening using the starch-sugar inter-conversion theory (4mks)

.....

.....

.....

23. A couple had the following as the appearance of their Red Blood Cells under a light microscope



- a) Which survival advantage does the couple have over those with normal Red Blood Cell appearance? (1mk)

.....

.....

- b) The couple had children. Write down all the probable genotypes of their children. Use letters **A** and **B** to represent the alleles (1mk)

.....

.....

SERIES 20

1. State two characteristics of organisms that are easily observed in both animals and plants. (2marks)

2. (a) Terrestrial insects such as locusts were captured and their blood was analysed. It was found that the blood does not have blood pigments such as haemoglobin. Explain. (2 marks)

(b) State how the tracheal system in insects is adapted to gaseous exchange. (3 marks)

3. State two functions of a diastema in herbivores. (2 marks)

4. State three biotic factors that could affect an antelope living in Masai Mara. (3 marks)

5. Describe how the leaves of submerged plants are adapted to gaseous exchange. (3 marks)

6. Name the part of the seed whose growth brings about epigeal germination. (1 mark)

7. State three aspects of light that affect the rate of photosynthesis. (3 marks)

8. (a) Identify the class with organisms that have three body parts and three pairs of legs. (1 mark)

(b) Suggest three reasons why members of the class named in (a) above are adapted to all types of habitats. (3 marks)

9. (a) List three types of gene mutation. (3 marks)

(b) (i) What are sex-linked genes? (1 mark)

(ii) Name two conditions that are sex-linked. (2 marks)

10. (a) Name two digestive enzymes produced in their inactive form. (2 marks)

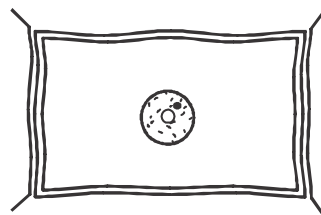
11. Name the organelles that carry out the following functions (4mks)

- (i) Destroy old and worn-out organelles
- (ii) Formation of spindle fibres
- (iii) Osmoregulation
- (iv) Selective passage of substances into the cell

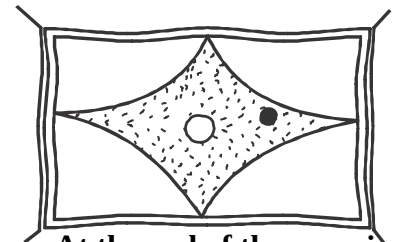
12. (a) Why would you give an athlete glucose and not sucrose after a race? (1mk)

(b) What happens to lactic acid after oxygen debt recovery? (2mks)

13. The diagram below represents a plant cell that was subjected to a certain treatment.



At the start



At the end of the experiment

a) Account for the shape of the cell at the end of the experiment.

(2 marks)

b) Draw a diagram to illustrate how an animal cell would appear if subjected to the same treatment. (1mk)

14. Name **two** types of valves in the heart.

(2 marks)

15.a) Name the hormones that controls metamorphosis in insects

(2marks)

b) Give one advantage of metamorphosis in insects

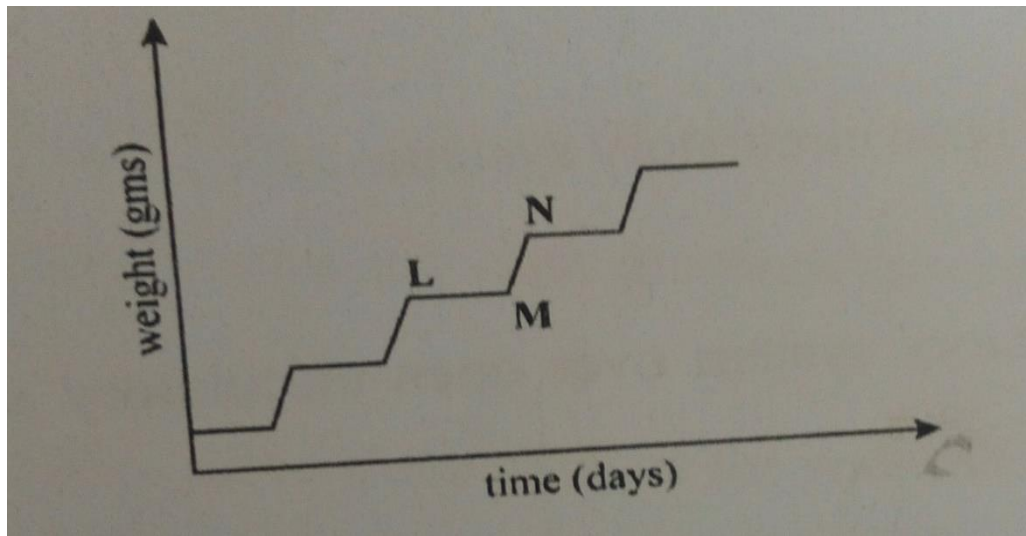
(1mark)

16a Name the physiological process by which water molecules move from one cell to the other
(1mark)

b) State the significance of the process in a) above

3marks

17.The graph below represents growth pattern in a group organism



(a)Name the type of growth curve (1 mark)

(b) Name the phylum that shows this type of pattern (1 mark)

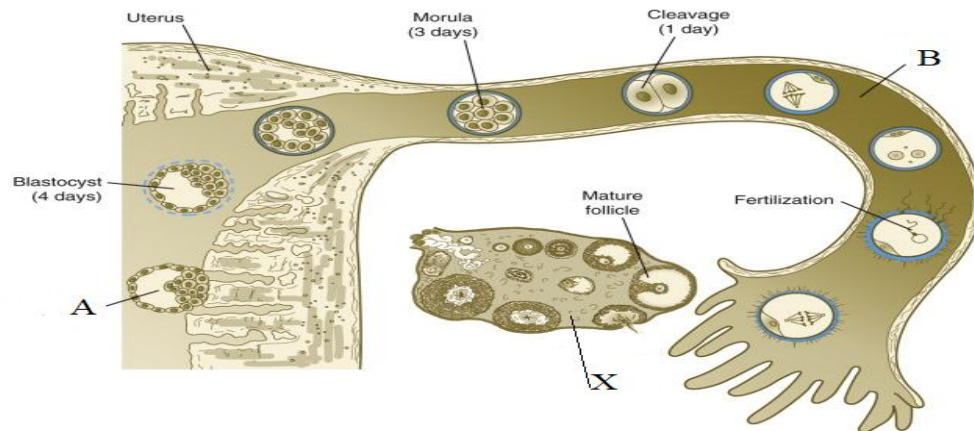
(c)State one disadvantage of this type of pattern (1mark)

18(a) How would you proof that a species of wildbeest in Tanzania belongs to the same species as a similar looking wildbeest in Kenya (1 mark)

(b) State two principles of Binomial Nomenclature. (2 marks)

19. Explain how altitude may affect the rate of breathing (2marks)

20. The diagram below shows some processes that take place in the ovary and oviduct around the time of fertilization.



Name _____

i) The process labeled A (1mark)

ii)

iii) Structure X and B (2marks)

X

B

iv) The hormone produced by structure labeled X (1mark)

21.(a)State three structural differences between arteries and veins (3marks)

(b)Name the blood vessels that transports blood to the following; (3marks)

i)heart to the lungs

ii)small intestine to the liver

iii)Aorta to the kidney

22a). State two theories that explains origin of life (2marks)

b) State three evidences of organic evolution (3marks)

23.Name the causative agent of the following diseases (2marks)

i) Malaria

ii)Typhoid

24. State three factors that increase the rate of traspiration. (3 marks)

25. Identify three methods that cause fruit dispersal. (3 marks)

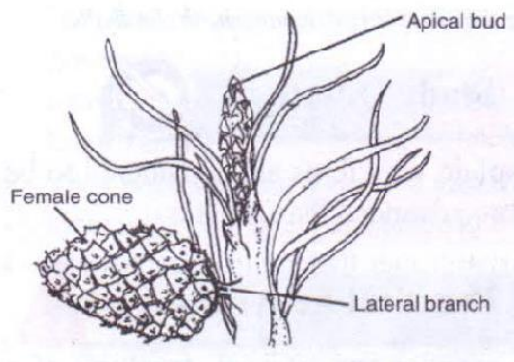
26.State one distinguishing characteristic of Kingdom Monera 1mark)

SERIES 21

1. The table below shows concentration of some minerals inside the cells of a water plant and in the surrounding water.

Mineral	Sodium	Magnesium	Calcium
Cell sap	631	202	318
Surrounding water	28	293	47

- a) Name the process by which magnesium is taken up by the plant. (1mrk)
.....
.....
- b) Explain why maize plant take up calcium minerals quicker in well aerated soils than in water logged soil.(3mrks)
.....
.....
.....
.....
2. Give a reason why a mature plant cell does not lose its shape even after losing water. (1mrk)
.....
3. i) State the function for co-factors in cell metabolism. (1mrk)
.....
ii) Give one example of a metallic co – factor. (1mrk)
.....
4. Name the features that increase the surface area of the small intestines.(2mrks)
.....
.....
5. a) Name three characteristics that are used to divide the members of phylum Arthropoda into classes. (3mrks)
.....
.....
.....
- b) The diagram below represents a certain plant species.



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

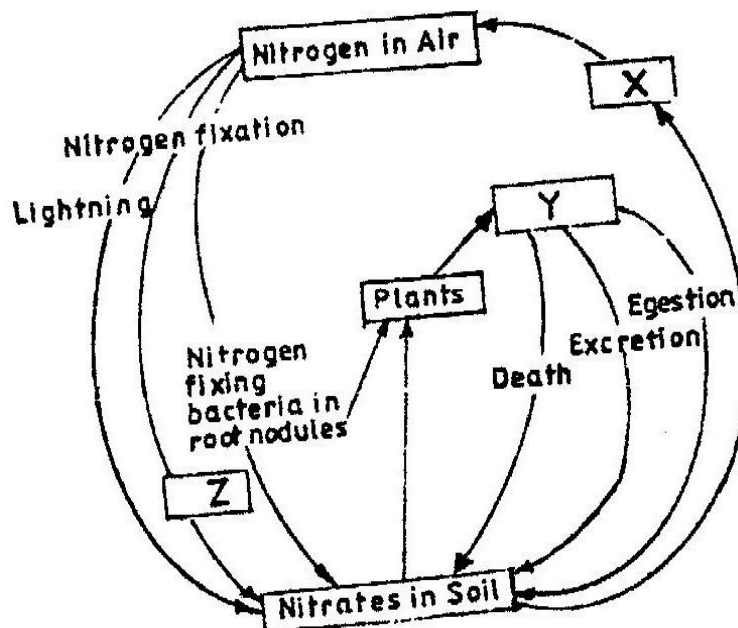
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ii) State one observable xerophytic characteristic seen in the diagram above? (1mrk)

.....

.....

6. The chart below represents a simplified nitrogen cycle.



What is represented by X, Y and Z. (3mrks)

X.....

Y.....

Z.....

7. People can die when they inhale gases from a burning charcoal stove in a poorly ventilated room. What compound is formed in the human body that leads to such deaths?

(1mrk)

.....

.....

8. Explain why blood from a donor whose blood group is A cannot be transfused into a recipient whose blood group is B. (2mrks)

In an experiment, a student covered one of the leaves of a potted plant on both upper and lower surfaces with blue cobalt chloride paper. The plant was exposed outside for 45 minutes.

Observation: The cobalt chloride on the undersurface of the leaf changed into pink in the first 20 minutes only as the upper surface remained blue. However at the end of the experiment, after 45 minutes, the upper surface also turned pink.

i) State the aim of the experiment. (1mrk)

ii) Give one significance of the results obtained. (1mrk)

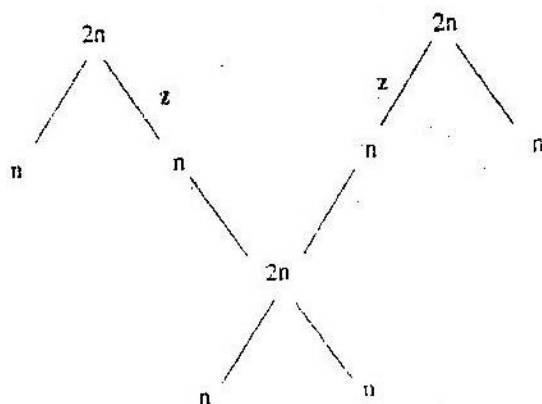
9. When transplanting seedlings, it is advisable to remove some leaves. Explain (1mrk)

10. a) Describe the path taken by carbon (IV)oxide released from the tissue of an insect to the atmosphere.(3mrks)

b) Name two structures for gaseous exchange in plants. (2mrks)

c) What is the effect of contraction of the diaphragm muscles during breathing in mammals?. (2mrks)

11. The chart below shows the number of chromosomes before and after cell division and fertilization in a mammal.



a). What type of cell division takes place at Z. (1mrk)

.....

.....

b) Where in the female body of humans does process Z occur?. (1mrk)

.....

.....

c) Name the process that leads to addition or loss of one or more chromosomes. (1mrk)

.....

.....

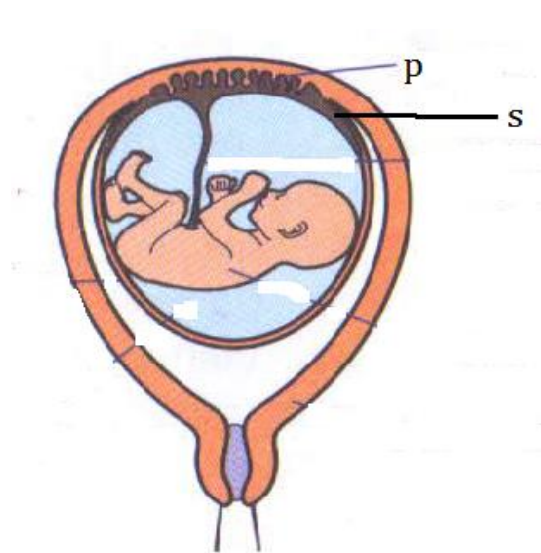
13. State three benefits of polyploidy in plants to a farmer.(3mrks)

.....

.....

.....

14. The diagram below represents human foetus.



a) Name the part labelled S (1mrk)

.....

.....

b) Give the roles of structure P in; (2mrks)

i) Nutrition.

.....

.....

ii) Protection.

.....

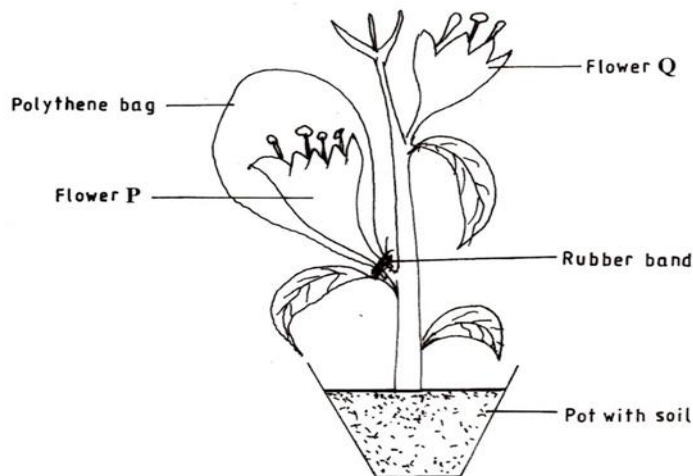
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d) What is the function of the following in the human male reproductive system?. (2mrks)

i) Epididymis.

ii) Scrotal sac.

15. The diagram represents an experimental set up used by students to investigate a certain process.



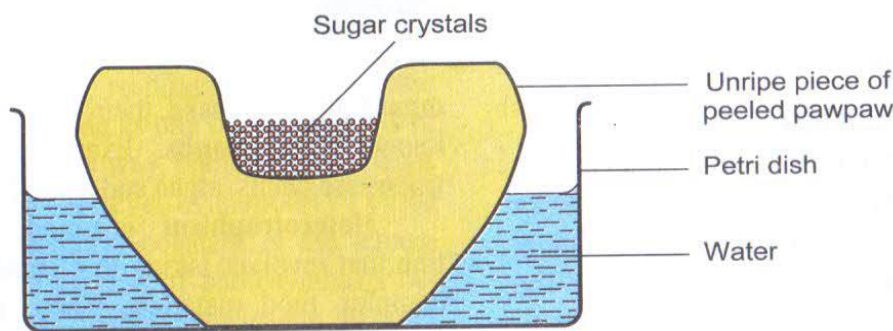
Flower Q produced seeds, while P did not. Account for the results (3mrks)

16. Name any two branches of microbiology.(2mrks)

17. Which biological tool would a scientist require to collect rats to be used for study? (1mrk)

18. Distinguish between magnification and resolution as used in microscopy. (1mrk)

19. A group of students set up an experiment to investigate a certain physiological process. The set up was as shown below.



a) Name the physiological process being investigated. (1mrk)

.....

b) Account for the formation and rise in the level of sugar solution at the end of the experiment. (3mrks)

.....

20. The scientific name of a blackjack is bidens pilosa. Identify two mistakes in the written name. (2mrks)

.....

21. State two advantages of natural selection to organisms. (2mrks)

.....

22. a) Give two ways in which sexual reproduction is important in the evolution of plants and animals. (2mrks)

.....

b) Explain why it is only mutations in genes of gametes that influence evolution (1mrk)

.....

23. Give the role of the following hormones during menstrual cycle. (3mks)

a) Follicle stimulating hormone.

b) Oestrogen.

c) Luteinizing hormone.

24. The chart below represents the result of successive crosses, starting with red- flowered plants and white flowed plants and in which both plants are pure breeding.

Parental genotypes: Red flowers x white flowers



First filial generation



Selfed

Second filial generation

3 red flowers: 1 white flower

Phenotypic ratio 3: 1

(a) What were the parental genotypes? Use letter R to represent the gene for red colour and r for white colour.(1mrk)

.....

(b) (i) What was the colour of the flowers in the first filial generation?. (1mrk)

.....

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

.....

(c) What is a test- cross?. (1 mark)

.....

.....

25. a) Name two tissues in plants which are thickened with lignin. (2 marks)

.....

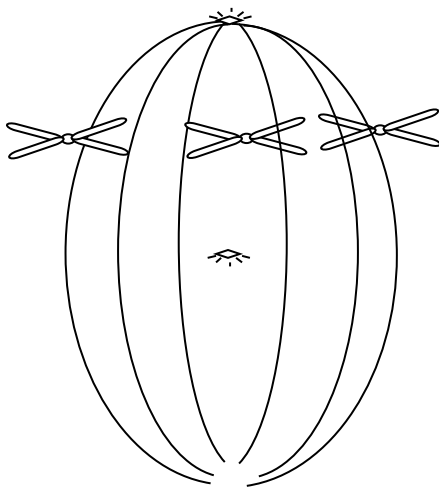
.....

b) How is support attained in herbaceous plants? (1 mark)

.....

.....

26. The diagram below shows a stage of a certain type of cell division.



a) Identify the stage and type of the cell division the above cell is undergoing. (2mks)

b) State two importance of the above type of cell division.(2mks)

27. The photograph below shows the effects of certain pollutant in Nairobi dam. Study it carefully and use to answer the questions that follow.



i) Suggest the main pollutant in the dam

(1mark)

.....
.....

ii) What are the possible effects of pollution illustrated in the photograph

(2mrks)

.....
.....
.....

iii) Suggest one possible pollution control measure that can be put in place to save aquatic organisms in the dam.

(1mark)

.....
.....

28. In a capture-recapture exercise to estimate population size of dragon flies on a stretch of rivers, 250flies were first caught and marked. Two days later 500 flies were caught in the second capture and out of this, 50 flies had marks on their bodies. Estimate the population size of the flies. (show your working)

(3mks)

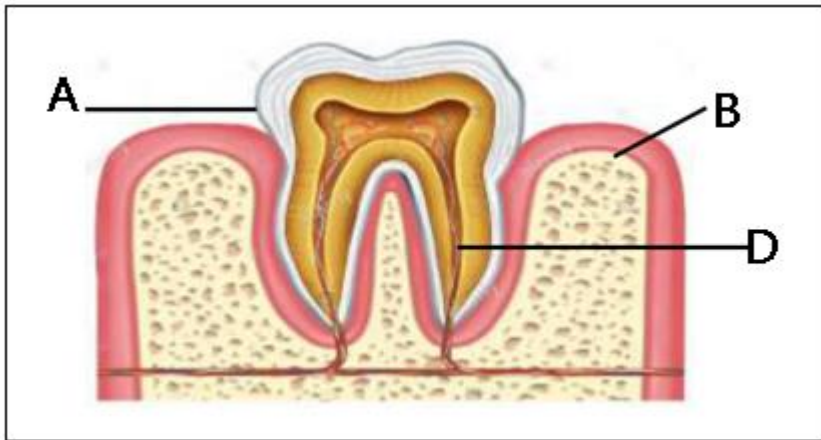
SERIES 22

1. How does growth as a characteristic of living organisms differ in plants and animals? **(2marks)**

2. (a) State **two** roles of active transport in animals **(2 mark)**

b) Cyanide lowers the rate of active transport. Explain? **(1mark)**

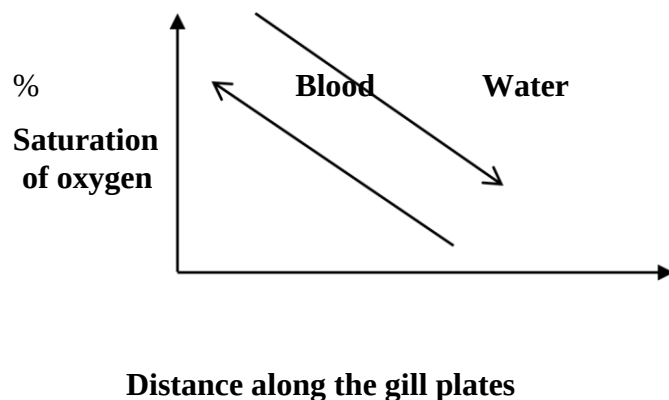
3. The figure below is a diagram of a vertical section of a mammalian tooth.



(i) Name the parts labelled **A** and **B**. **(2 marks)**

(ii) State **ONE** way in which structure **D** is adapted to its functions. **(1mark)**

4. The figure below shows % saturation of oxygen in blood in fish as water passes along the gill plate.

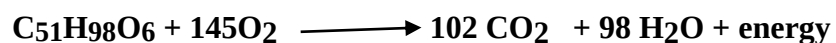


(a) (i) Name the type of blood flow shown in the gill plate. (1mark)

(ii) Explain the advantage of the type of flow named in a (i) above. (2marks)

(b) State organs in humans which display the type of flow named in a (i) above. (1mark)

5. The equation below shows an oxidation reaction of food substances.

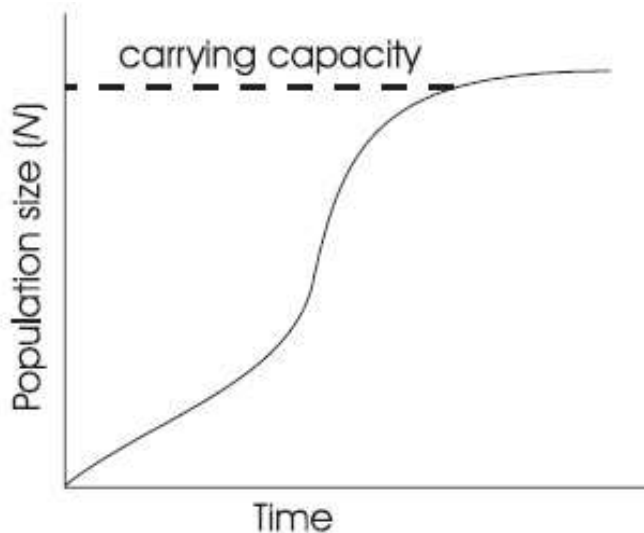


a) What do you understand by the term respiratory quotient? (1mark)

b) Determine respiratory quotient of the oxidation of food substance. (2marks)

c) Identify the food substance. (1mark)

6. When any one of the growth parameters such as growth in size or weight, increase in number of cells are plotted in a graph against time like below, a clear curve is obtained.



State its name.

(1mark)

7. The embryo of a dry, fully developed seed usually passes through a period of rest after ripening period and it cannot germinate even when provided with all favorable conditions. State the significance of this. **(2marks)**

8. a) Cowpeas seeds were placed in a vacuum flask and left for five days. What is the expected change in composition of gases in the flask on the sixth day? **(1mark)**

b) Give a reason for your answer in (a) above **(1mark)**

9. Biotechnologists work day and night to curb food insecurity using the knowledge of polyploidy in genetics. Explain the economic importance of such practice? **(2marks)**

b) Define a backcross? **(1 mark)**

10. The structure below was obtained from an animal cell



a) What is the name of the hair-like structure and state its function? **(2marks)**

b) From which parts of the mammalian body are these structures found? **(1mark)**

11. A student was found to have blood group B+.

a) What type of antibody is present in his plasma?

(1mark)

b) Which antigens are present in this blood group?

(1mark)

12. Plants relatively have less waste to excrete than animals. Give **ONE** reasons to explain this observation,

(1marks)

13. State **TWO** methods by which plants get rid of their waste products.

(2marks)

14. To estimate the population size of mosquitoes in **Banji** village that covers an area of 25km², visiting researchers caught 400 mosquitoes which they marked and released. After 24 hours, 200 mosquitoes were caught out of which 120 had not been marked.

(a) Suggest the sampling method described above.

(1 mark)

(b) What are the disadvantages of this method?

(2 marks)

15. The table below shows stomatal distribution on leaves A and B and their surface area. Use the information to answer the questions.

	Leaf surface	A	B
Number of stomata	Upper leaf surface	20	5
	Lower leaf surface	0	15
Surface area		25 cm ²	18cm ²

Identify with reasons the habitats of the plant from which the leaves were obtained.

Leaf A: Habitat: (1 mark)

Reason; (1 mark)

Leaf B: Habitat: (1 mark)

Reason: (1 mark)

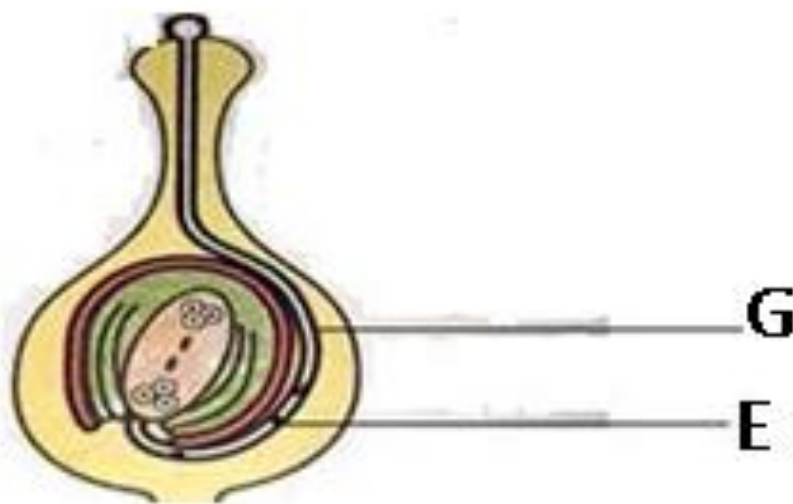
16. Name the causative agent of the following diseases. (2 marks)

(i) Trichomoniasis.

(ii) Gonorrhea.

17. The diagram below shows a pollen tube as it develops down the style.

Use it to answer the questions that follow;



(i) Name the part labelled **G**. (1 mark)

(ii) State **two** functions of part labelled **E**. (2 marks)

18. (a).Define parthenocarpy.

(1 mark)

(b)Name the plant hormone that induces fruit ripening.

(1 mark)

19. A group of Form Three students collected a certain specimen for study as shown below. Study it carefully and use it to answer the questions that follow.



(i)Name the type of metamorphosis that the above specimen undergoes.

(1 mark)

(ii)Give any **two** advantages of the above metamorphosis.

(2 marks)

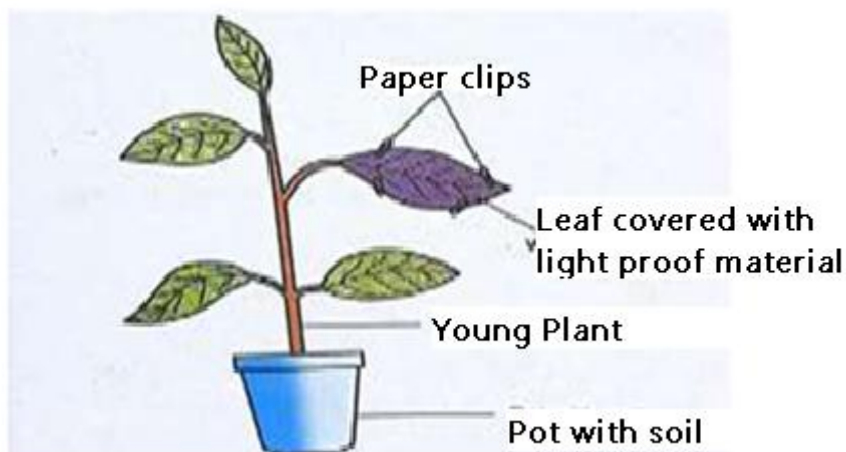
20. (i).Give **two** structural features in a leaf that adapts it to absorb Carbon (IV) Oxide.

(2 marks)

(ii)Name the cell organelle in which Carbon (IV) oxide combines with water to form a complex organic compound takes place.

(1 mark)

21. In an experiment to investigate a factor affecting photosynthesis; leaf of a potted plant, which had been kept in the dark overnight was covered with an aluminum foil as shown in the diagram below. The set up was kept in the sunlight for three hours after which food test was carried out.



(a) Which factor was being investigated in the experiment? **(1 mark)**

(b) Which food test was carried out? **(1 mark)**

(c) State the results of the food test. **(1 mark)**

22. Explain how the following plant adaptations minimizes rate of transpiration. **(2marks)**

a) Sunken stomata.

b) Thick cuticle.

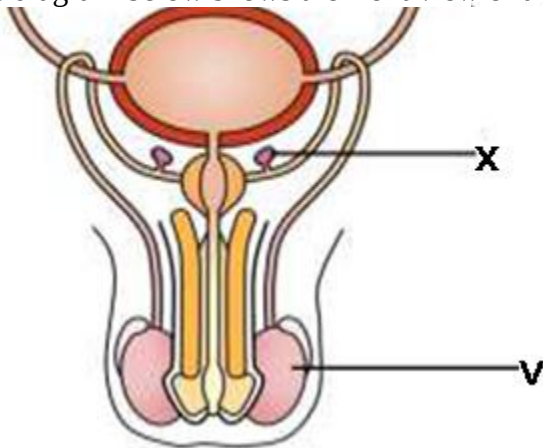
23. Explain how drooping of leaves on a hot sunny day is advantageous to a plant.

(2marks)

24. Name **two** tissues in plants which are thickened with lignin.

(2marks)

25. The diagram below shows the front view of a male reproductive system.



a) Give the functions of the structures labelled X and V.

(2marks)

b) What is the role of Follicle Stimulating Hormone in male reproduction?

(1mark)

26. How do the following factors hinder self-pollination in flowering plants?

(3marks)

a) Self-sterility.

b) Heterostyly.

c) Protogyny.

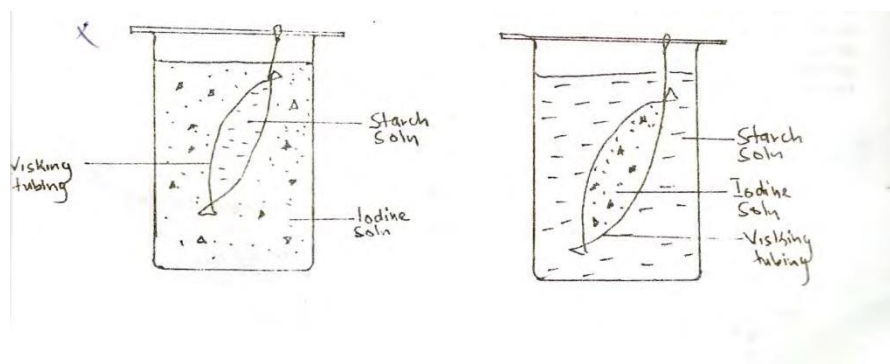
27. The table below shows the concentration in parts per million of sodium and iodide ions in sea water and cell sap of a plant.

	Sodium ions concentration	Iodide ions concentration
Sea water	326	39
Cell sap	162	574

a) i) Which of the two ions intake will be affected if the plant was sprayed with a chemical that inhibits respiration. **(1mark)**

ii) Explain your answer in 27(a) (i) above. **(1mark)**

b) An experiment was set up as shown in the diagram below.



At the end of the experiment, it was observed that the starch turned blue black while the color of iodine solution in the beaker did not change. Account for this observation. **(2 marks)**

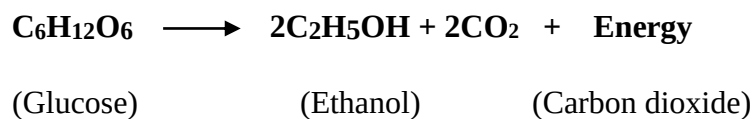
28. State the role of the following organelles: **(3 marks)**

a) Ribosomes.

b) Chloroplast.

c) Nucleus

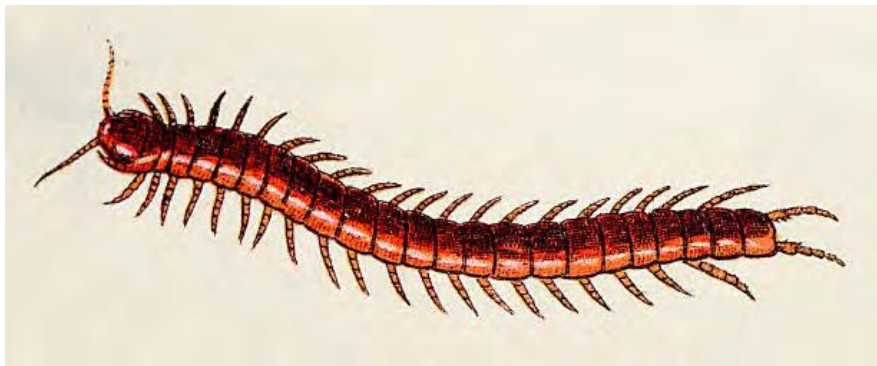
29. A process that occurs in plants is represented by the equation below.



a) Name the process. (1 marks)

b) State **two** economic importance of the process named in (a) above. (2 marks)

30. Below is a diagram of an organism.

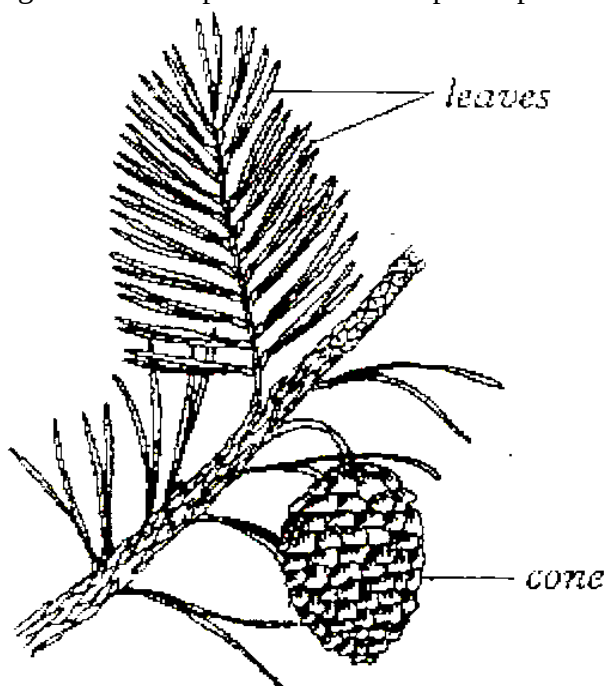


a) Identify the Class to which the organism belongs. (1 mark)

b) State **two** features shown on the diagram that are characteristics of this Class.

SERIES 23

1. Give the role of the following parts of microscope. (3marks)
 - i) Mirror
.....
 - ii) Diaphragm
.....
 - iii) Coarse adjustment knob
.....
2. (a) What **three** characteristics are used to divide the phylum arthropoda into classes? (3mks)
.....
.....
.....
- (b) The diagram below represents a certain plant species.

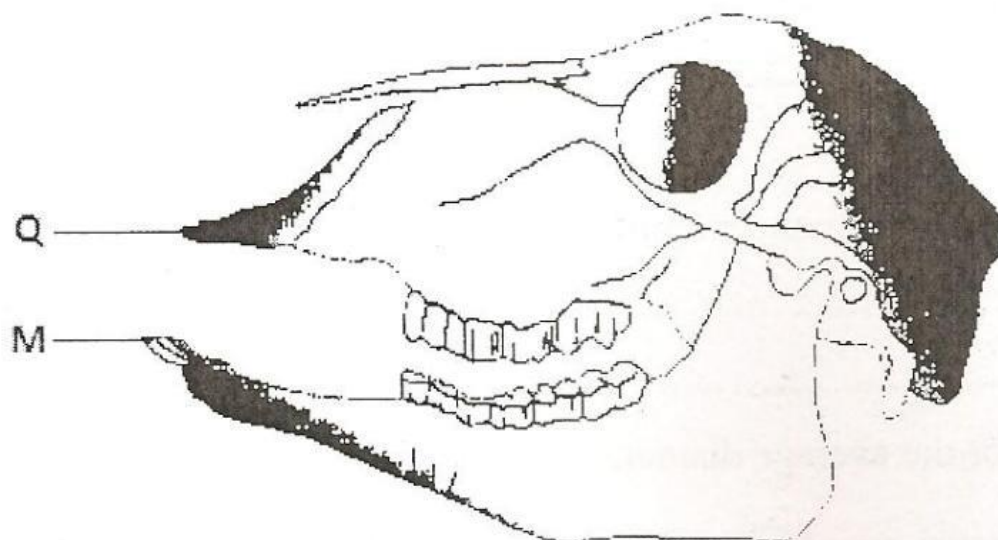


- i) State the class to which the plant belongs. (1 mark)
.....
- ii) State two differences between members of Gymnospermaphyta and Angiospermaphyta (2 marks)

Gymnospermaphyta	Angiospermaphyta

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

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



(a) Name the tooth labeled M.

(1 mark)

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

(2 marks)

Name:

Role:

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

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

(1mark)

(b) Why was sodium carbonate added?

(1mark)

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

(1mark)

5. (a) Define the following terms as used in ecology.

(2 marks)

i) Biosphere

ii) Biomass

(b) Form three students wanted to estimate the population of grasshoppers in 8km² grass field near a school compound. They captured 72 grasshoppers and marked them before returning them back to the field. After three days they made another catch of grasshoppers. They collected 147 grasshoppers of which only 29 had marks.

i) State why the second capture was done after three days.

(1 mark)

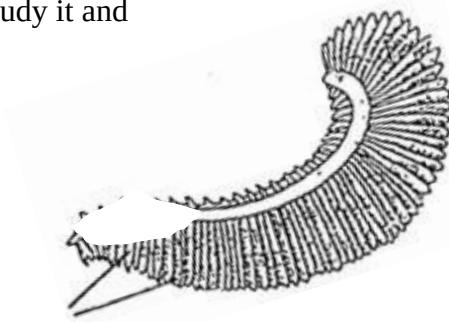
iii) From the data, calculate the population size of grasshoppers in the grass field.
(2 marks)

6. a) State the most suitable biological tool for collecting the following organisms:-
i) A moth from a farm. (1 mark)

ii) Ants from a tree trunk. (1 mark)

7. The diagram below
bony fish. Study it and

represents an organ from a finned
answer the question that follows



i. Identify the organ illustrated above. (1mark)

ii. State three adaptations of the part labeled S to its functions. (3 marks)

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

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

9. a) Name the organelle where Kreb's/ citric acid cycle take place in a cell.
(1mark)

b) In which organelle is each of the following found: (2mark)

i) Lytic enzymes

ii) Chromosomes

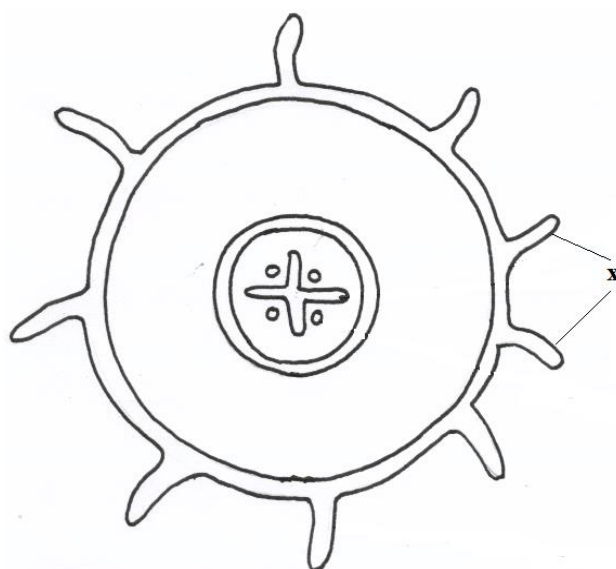
10. State the importance of osmo- regulation in organisms (2 marks)

11. Explain why unicellular organisms such as paramecium lack complex organs for gaseous exchange. (2marks)

.....

.....

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



- a) Name the class in which the plant belongs. (1mark)

.....

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

.....

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

.....

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

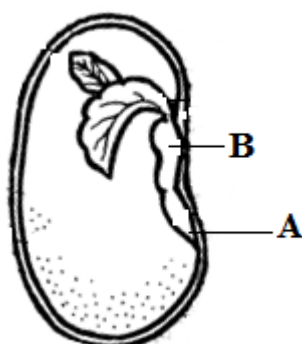
- (a) Semi – circular canals. (1mark)

.....

- (b) Eustachian tube. (1mark)

.....

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



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

 (b) Why is it important that the part labeled A develops first during germination? (2 mark)

15. The diagram below represents a mammalian bone.

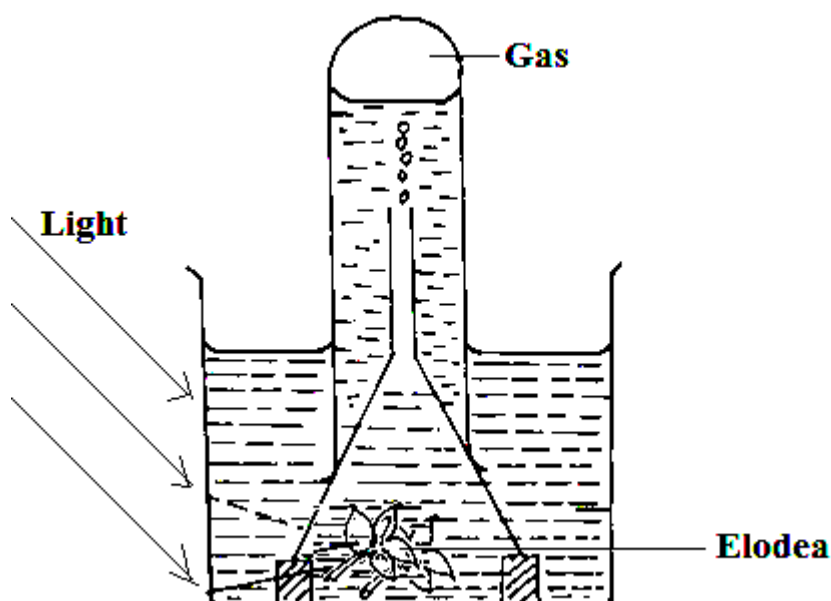


- (a) Identify the bone (1 mark)

 (b) i) Name the bones that articulate with this bone at points K and L (2 marks)

 16. The equation below represents a metabolic process that occurs in the mammalian liver.
 Amino Acids $\longrightarrow$ Organic compound + Urea
 Name the process (1 mark)

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



(a) State the process that was being investigated. (1 mark)

.....
.....
.....

(b) Other than the factors shown, state two factors that would affect the process named in (a) above. (2 marks)

.....
.....

18. Give an example of the sex linked trait in humans located on Y – Chromosomes (1mark)

X – Chromosomes (1 mark)

.....

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

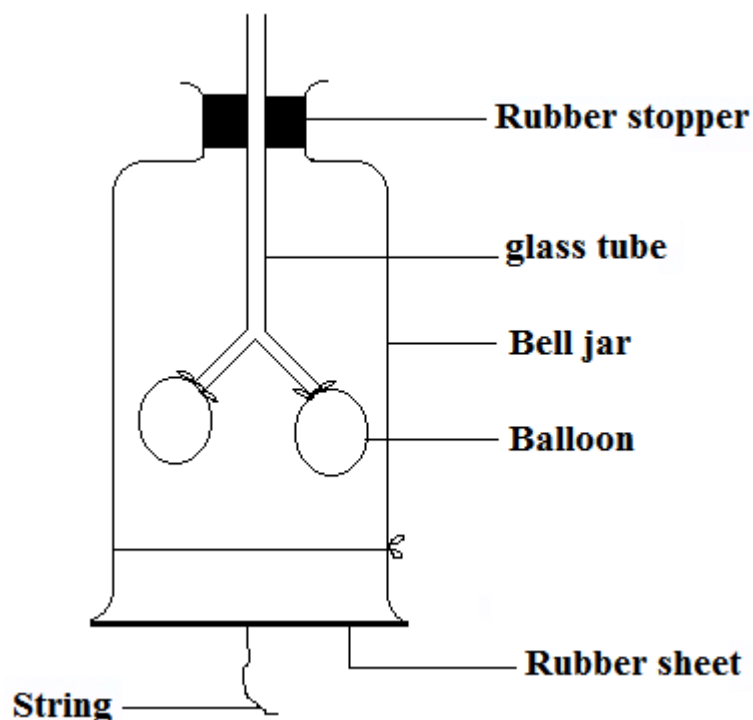
.....
.....
.....

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

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

- i.
ii.
iii.

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



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

- i) Glass tube.....
ii) Rubber sheet

(b) Explain what will happen to the balloons if the rubber is pulled down wards. (2 marks)

.....

.....

.....

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

.....

.....

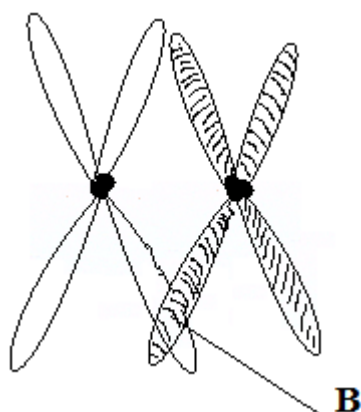
.....

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

.....

.....

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



a) Identify the stage of cell division in which this phenomenon occurs. (1 mark)

.....

b) State the importance of the phenomenon taking place in the part labeled B. (2 marks)

.....

.....

24. a) State one advantage of double circulation over single circulation. (1mark)

.....

b) State two adaptations of blood capillaries to their functions. (2marks)

.....

.....

25. a) Name a growth hormone that has inhibitory effects in plants growth. (1mark)

.....

b) State two characteristics of meristematic cells. (2marks)

.....

.....

26. Write down two functions of exoskeleton. (2 marks)

SERIES 24

1. Some form one students wanted to collect the following animals for study in the laboratory. **State** the suitable apparatus they should use.

i) Housefly (1 mk)

.....

ii) Scorpion (1 mk)

.....

iii) Ants (1 mk)

.....

2. State **two** reasons why a snake is classified as a reptile. (2 mks)

.....

.....

3. (a) **Explain** the role of oxygen in Active transport (1mk)

.....

.....

(b) Name **two** processes that depend on Active transport in animals (2mks)

.....

.....

.....

4. **Explain** how sunken stomata lower the rate of transpiration (2mks)

.....

.....

5. **State** how xylem vessel is adapted to its function (3mks)

.....

.....

.....

6). a) **Define** the term immunity. (1mk)

.....
.....

b) **Distinguish** between natural immunity and acquired immunity. (1mk)

.....
.....

c) Identify **one** immunizable disease in Kenya. (1mk)

.....
.....

7. (a) State **two** adaptations of the alveolus to its functions. (2mks)

.....
.....

(b) **Suggest** a reason for asthmatic patient producing a wheezing sound during breathing? (1mk)

.....
(c) **What** is the significance of the cartilage found in the human trachea being incomplete (c- shaped rings) (1mk)

.....
8. **Define** the following terms;

(i) Inter specific competition. (1mk)

.....
(ii) Carrying capacity (1mk)

.....
.....

9. Suggest **two** methods that can be used to determine the type of food eaten by animals. (2mks)

.....
.....

10. (a) State **one** significance of genetics counseling (1mk)

.....

(b) Part of a strand of DNA molecules was found to have the following sequence
A-T-C-G-G-G-A-T-C-T. What is the sequence?

(i) Of the complementary strand? (1mk)

.....

(ii) On a m- RNA strand copied (1mk)

.....

11). The paddles of whales and the fins of fish adapt these organisms to aquatic habitats.

a) **Name** the evolutionary process that may have given rise to these structures. (1mk)

.....

b) What is the **name** given to such structures? (1mk)

.....

c) Give **two** examples of vestigial organs in man. (2mks)

.....

12. Name the organelles that carry out the following functions (4mks)

(i) Destroy old and worn-out organelles

.....

(ii) Formation of spindle fibres

.....

(iii) Osmoregulation

.....

(iv) Selective passage of substances into the cell

.....

13. (a) Why would you give an athlete glucose and not sucrose after a race? (1mk)

.....
.....

(b) What happens to lactic acid after oxygen debt recovery? (2mks)

.....
.....

14. **State** the difference between glycolysis and kreb's cycle based on the following.

a) where they occur . (1 mk)

.....

b) Amount of energy produced. (1 mk)

.....

c) End product(s) (1 mk)

.....

15. a) Under which of the following magnifications would one see a larger part of the specimen X40 Or X500? Give a reason. (2 mks)

.....

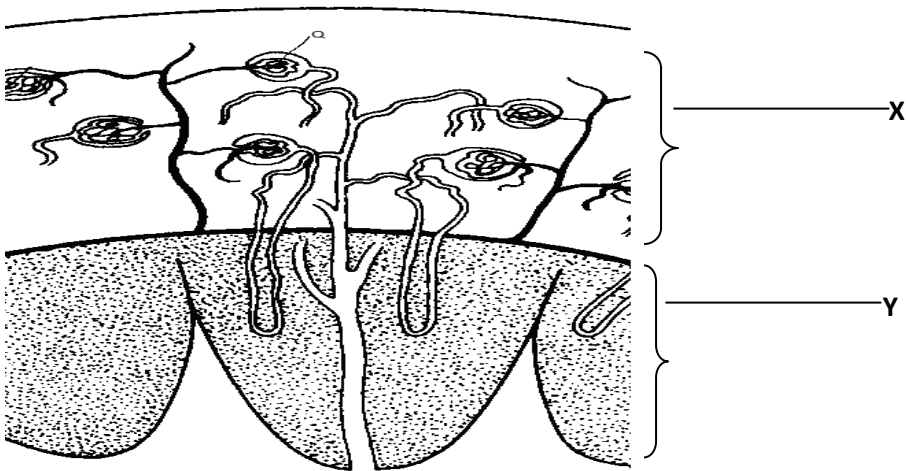
.....

b) State how magnification is worked out in a light microscope. (1 mk)

.....

.....

16. The illustration below shows a transverse section through a mammalian kidney.



(a) **Name** the structures labelled X and Y.

X (1mk)

Y (1mk)

(b) **State** the process in Q that leads to the formation of glomerular filtrate. (1mk)

.....

c) State one function of sebum (1 mk)

.....

.....

17. State **three** differences in composition between umbilical artery and umbilical vein. (3 marks)

Umbilical vein	Umbilical artery

--	--

18. (a) **What** is meant by the term taxonomy?

(1mk)

.....

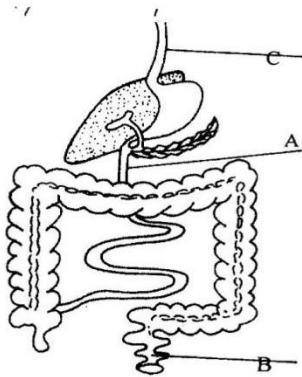
(b) **When** are two organisms considered to belong to the same species.

(2mks)

.....

.....

19). The diagram below shows part of alimentary canal of a mammal



(i) **Name** the parts labeled **A** and **C**

(2mks)

A

C

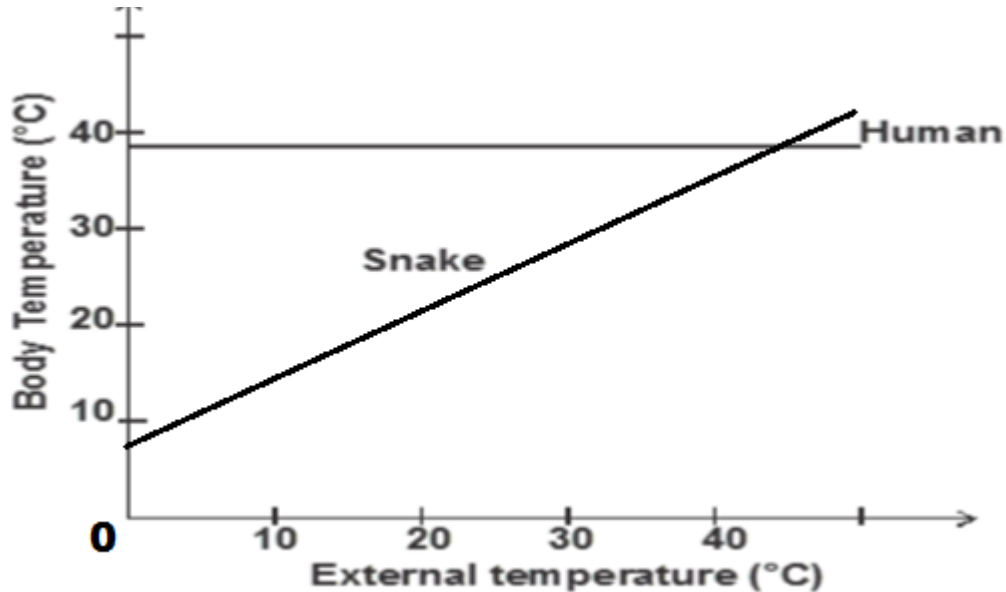
(ii) **State** the function of the part labeled **B**.

(1mk)

.....

.....

20). The graph below shows the relationship between body temperatures and external temperatures in a human being and a snake. **Study** it and answer questions that follow.



a) **What** happens to the temperature of each organism as the external temperature increases. (2 mks)

Human —.....

Snake —.....

b) Humans are described as homoithermic. **State** the advantage of this condition. (2mks)

.....

.....

21.a) State **three** differences between light stage and dark stage of photosynthesis. (3 mks)

Light stage	Dark stage

22. Define;

i) Pulmonary circulation

(1mk)

.....

.....

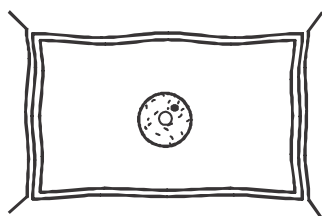
ii) Systemic circulation

(1mk)

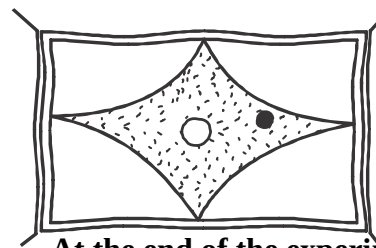
.....

.....

23 .The diagram below represents a plant cell that was subjected to a certain treatment.



At the start



At the end of the experiment

a) Account for the shape of the cell at the end of the experiment.

(2 mks)

.....

.....

.....

b) Draw a diagram to illustrate how an animal cell would appear if subjected to the same treatment. (1mk)

24. a) **Give** a reason why each of the following steps are followed when preparing cross sections of a leaf for examination under a microscope.

i) Cutting thin sections. (2 mk)

.....

ii) Placing the sections in water. (1 mk)

.....

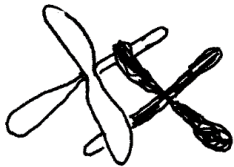
25. Explain **why** the population of people with sickle cell anaemia is higher in malaria prone areas. (3mks)

.....

.....

.....

26. The diagram below is of a stage in cell division



With a reason identify the stage.

Stage (1 mk)

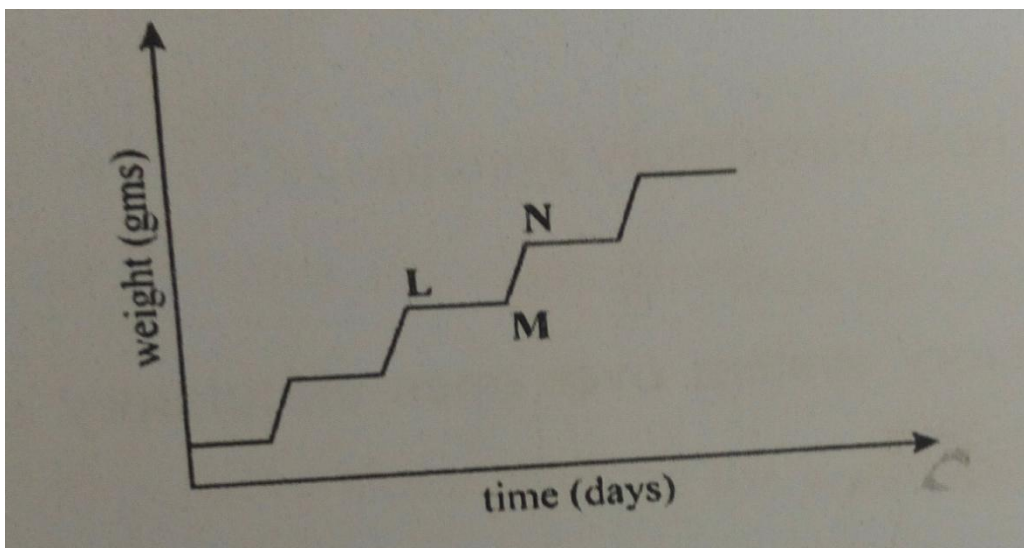
.....

Reason (1 mk)

.....

.....

27. The graph below represents growth pattern in a group organism



(a) Name the type of growth curve (1 mk)

.....

(b) Name the phylum that shows this type of pattern (1 mk)

.....

(c) State one disadvantage of this type of pattern (1 mk)

.....

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SERIES 25

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



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

.....

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

.....

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

.....

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

(a) Pollen grain. (1 mark)

.....

.....

(b) Stigma. (1 mark)

.....

.....

3. A certain plant was found to have the following features

- ✓ Parallel venation of leaves.
- ✓ Sheath like petiole.
- ✓ Flower parts in multiple of three.

a) Name the class to which the plant belongs. (1mark)

.....

b) Suggest the expected arrangement of vascular bundle in the stem of the plant. (1mark)

4. In an experiment, the rate of gaseous was determined and recorded as shown in the table below. Using these figures, suggest which plant gaseous structure were responsible for these figures

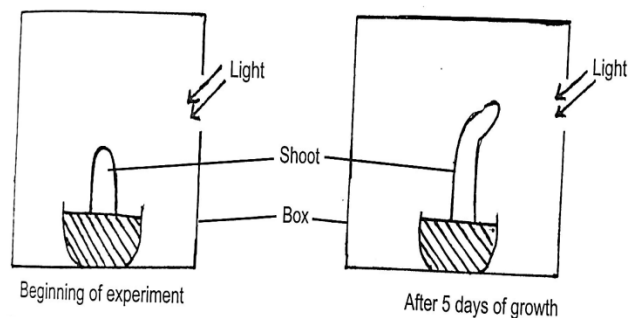
Structure	Gaseous exchange in %
A	Approximately 97
B	Approximately 2.5
C	Approximately 0.5

A..... (1mark)

B..... (1mark)

C.....(1mark)

5. The diagram below shows an experiment set up using a seedling enclosed in a desk box with a hole on one side at the beginning of the experiment and after five days of growth.



(a) What type of response is shown by the above shoot? (1 mark)

(b) State **two** observable changes which took place in the seedling after five days of growth.

(2 marks)

(c) Account for the observable changes in (b) above. (2 marks)

6. a) State the reason for the following adaptation of the xylem vessels

(2marks)

i) Narrow lumen

.....
.....

ii) Lack of cross wall

.....
.....

7. Name the organism that causes each of the following diseases.

i) Gonorrhea

(1mark)

.....

ii) Amoebic dysentery

(1mark)

.....

8. a) What is a species?

(1mark)

.....
.....

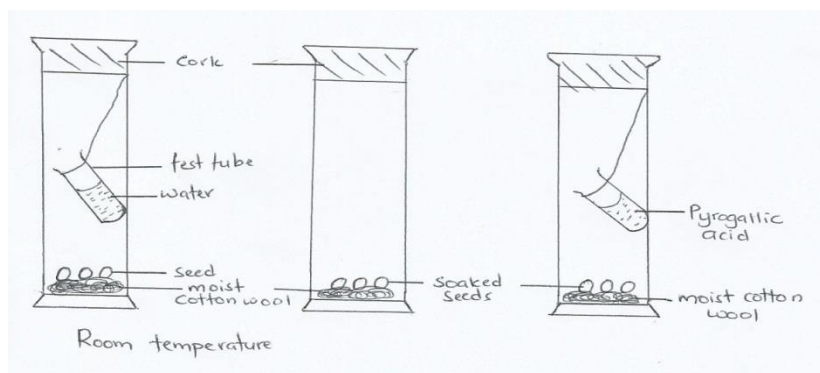
b) A horse and a donkey can interbreed to give rise to an offspring, the mule. However they are still considered to belong to different species. Explain

(1mark)

.....
.....

9. The diagram below represents a set up to investigate the conditions necessary for seed germination.

The set up was left for 5 days.



a) What conditions were being investigated in the experiment?

(2marks)

.....
.....

b) Explain the role of water during seed germination.

(2marks)

.....

.....

.....

10. Explain what happens to excess amino acids in the liver of humans.

(2marks)

.....

.....

.....

11. State the branch of Biology that deals with:

(2 marks)

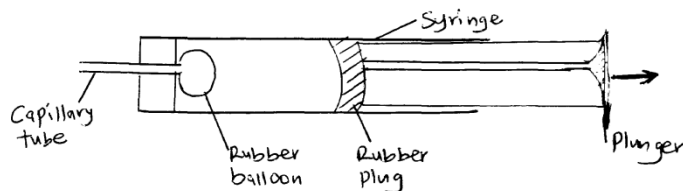
(a) Study of birds

.....

(b) Study of the chemical composition of organisms

.....

12. The apparatus below illustrates breathing in a mammal.



(a) State the organs represented by:

(i) Rubber

(1 mark)

.....

(ii) Rubber plug.

(1 mark)

.....

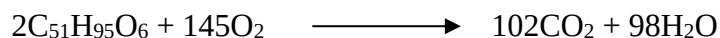
(b) Explain what happens if the rubber plug is pulled in the direction shown by the arrow. (2 marks)

.....

.....

.....

13. (a) Calculate the respiratory Quotient(RQ) from the equation below. (2 marks)



(b) Identify with a reason the substrate being respired from the equation above. (1 mark)

.....

.....

14. The diagram below shows the base sequence of part of a nucleic acid strand. Study it and answer the questions that follow.

G-T-T-A-G-C-T-G-A

(a) With a reason state whether the strand above is from a DNA or RNA molecule. (2 marks)

.....

.....

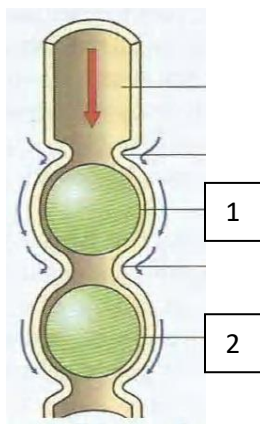
(b) State **two** structural differences between DNA and RNA strands. (2marks)

.....

.....

.....

.....
.....
15. The diagram below shows how food bolus moves along the alimentary canal and intestines.



(a) Identify the process illustrated on the diagram.

(1 mark)

.....
(b) Briefly explain how the movement of food bolus from position 1 to position 2 in the diagram above is achieved.

(2 marks)

.....
.....
16. A person was complaining of thirst most of the times. A sample of the patient's urine was found to contain a lot of sugar.

(a) Name the hormone the person's body was deficient of.

(1 mark)

.....
(b) Which disease was the person likely to be suffering from?

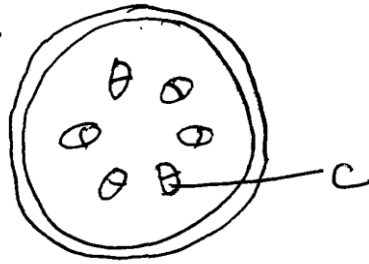
(1 mark)

.....
17. Name two mechanisms that hinder self fertilization in flowering plants.

(2 marks)

.....

18. The diagram below represents a cross section of a plant organ. Study it and answer the questions that follow.



(a) (i) From which plant organ was the section obtained from? (1 mark)

.....

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

.....

(b) What is the function of the part labeled C? (1mark)

.....

19. (a) What is meant by vestigial structures? (1 mark)

.....

(b) Give two examples of vestigial structures in humans. (2 marks)

.....

20. Julie observed 8 onion epidermal cells across a field of view of a light microscope. The field of view was 4 mm in diameter; calculate the average of the cells in micrometres. (2 marks)

.....
.....
.....
21. State the use of the following plant waste products to humans. (2 marks)

(i) Papain.....

(ii) Colchicine.....

22. A student dropped a small piece of fresh liver in a beaker containing hydrogen peroxide. A lot of fizzling and froth was observed.

(a) Name the gas produced. (1 mark)

.....

(b) Write the word equation for the reaction above. (1 mark)

.....

.....

23. Give the functions of the following ecological instruments (2marks)

(a) Seechi disc

.....

(b) Photographic light meter

.....

24. (a) Explain why fertilization must take place in the fallopian tube but not uterus (1mark)

.....

.....

.....

.....

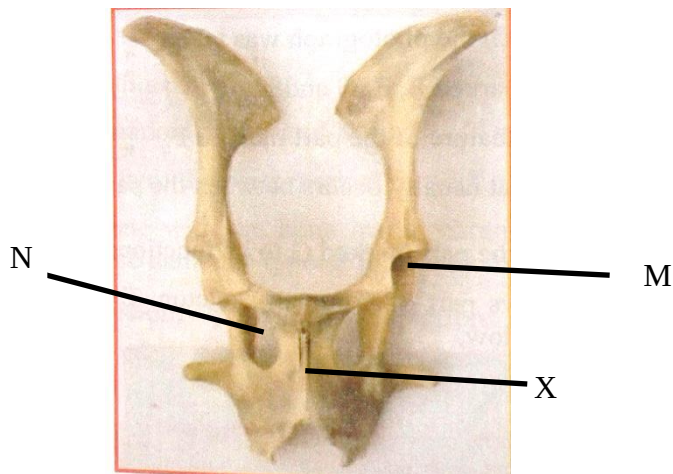
(b) Explain double fertilization in flowering plants (2marks)

.....

.....

.....
.....

25. The diagram below represents a mammalian bone of the appendicular skeleton



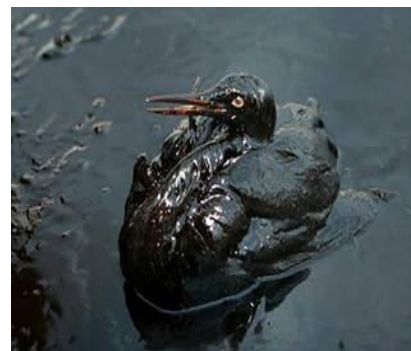
(a) Name and state the functions of the part labeled M and N. (2marks)

.....
.....

(b) State how the structure X is adapted to its function (1mark)

.....
.....
.....

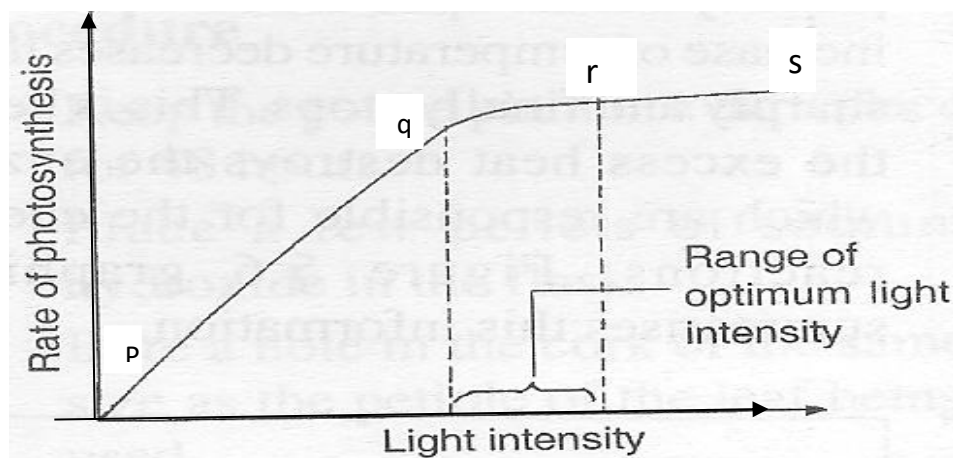
26. Use the illustration below to answer questions that follow.



(a) Identify the type of pollution that has such an effect. (1 mark)

.....
(b) State two effects of the type of pollution identified in (a) above to the organism. (2 marks)
.....
.....
.....

27. The curve below shows the rate of photosynthesis at different light intensities



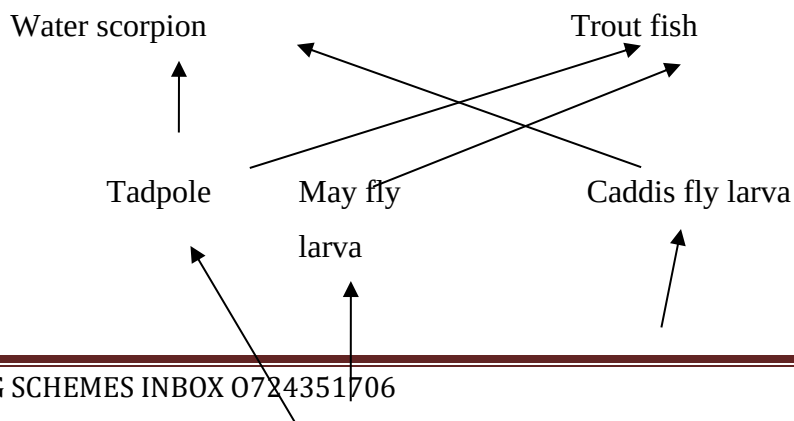
a) With reference to photosynthesis, give the meaning of the phrase limiting factor. (1mark)
.....

b) Name the limiting factor between the following points (2marks)

i) P and Q
.....

ii) R and S
.....

28. Study the food web below and answer the questions that follow.



Algae
Detritus (Simple Plant)

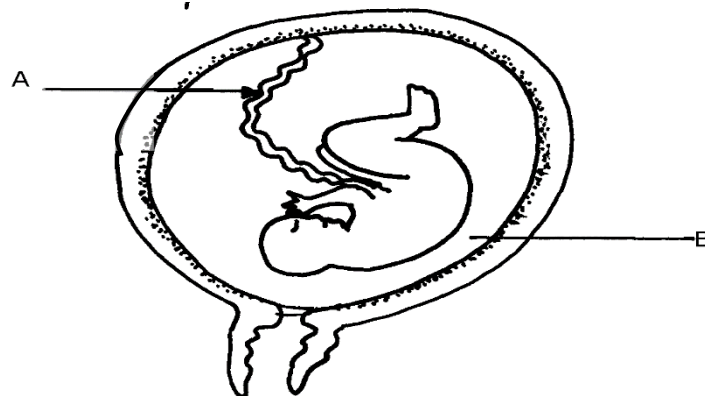
- a) Write down a food chain whose all consumers are Arthropods. (1mark)

.....

- b) What would be the short term effects on the habitat if all trout fish were eliminated? (2marks)

.....

29. The diagram below represents a stage in the development of human foetus



- (a) State **one** function of each of the structures labelled **A** and **B**. (2marks)

- (b) Apart from the size of the foetus what else from the diagram illustrates that parturition was about to occur. (1mark)

.....
.....

30. Explain why growing grass die a few days when salt is sprinkled on it. (2marks)

.....
.....

31. (a) What is carbonic anhydrase? (1 mark)

.....
.....

- (b) State the role of haemoglobin in the transport of carbon (IV) oxide. (2 marks)

SERIES 26

1. State three importance of osmosis in plants. (3mks)

2. Name the organelle that:

(a) is the most abundant in skeletal muscle cell (1mk)

(b) assist in the formation of spindle fibres during cell division. (1mk)

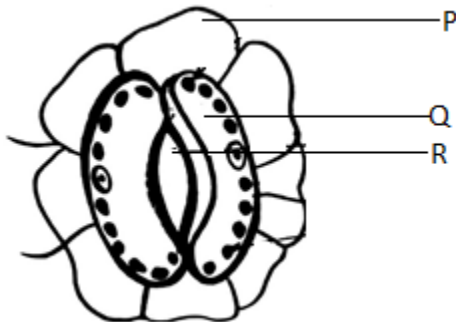
3.(i) Identify the nucleic acid whose base sequence is shown below. (1mark)

G - A - C - U - A - G - C - G - U

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

(iii) If this nucleic acid was involved in protein synthesis, how many amino acids would be present in the protein synthesized. (2mks)

4. The diagram below represents a structure found in plants.



(a) Name the parts labelled **P** and **R** (2mks)
P -

R -

(b) **State** how cell Q is adapted to its function (2mks)

5. The diagram below represents a certain organism collected by a student on his way to school



a) State the class to which the organism belongs. (1mk)

b) Give two reasons for your answer in (a) above. (2mks)

6. State three reasons why green plants are included in the fish aquarium. (3mks)

7. State two adaptations of the alveolus to its functions. (2mks)

8(a) Why may an asthmatic patient produce a wheezing sound during breathing? (1mk)

(b) What is the significance of the cartilage found in the human trachea being incomplete (C-shaped rings) (1mk)

9. a) State **three** characteristics of Monera that are not found in other kingdoms. (3mks)

b) Name the class to which a dolphin belongs.

(1mk)

10.a) Obesity increases the risk of a person developing cardiovascular disease and losing weight can reduce the risk of this disease occurring. Explain why exercise can cause weight loss (2mks)

(b)The Figure below shows a gastric band fitted to a stomach.



Explain how a gastric band helps a person to lose weight. (2mks)

11. a) What is genetic engineering?

(1mk)

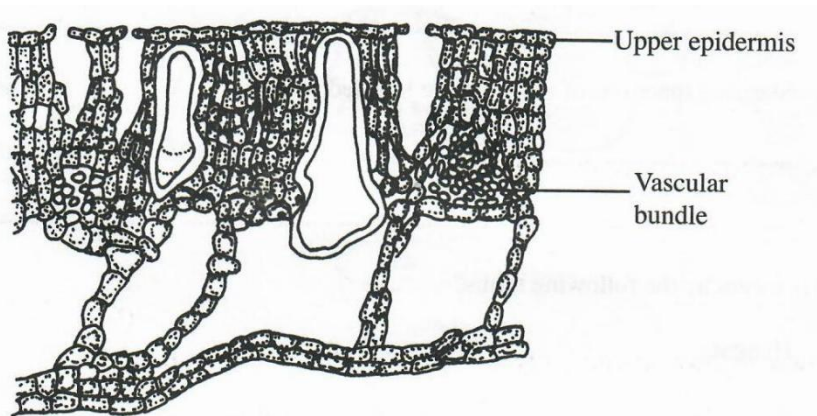
b) What is meant by hybrid vigour?

(1mk)

12. How is the mammalian fallopian tube adapted to its function.

(2mks)

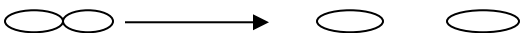
13. The diagram below shows a transverse section of a leaf.

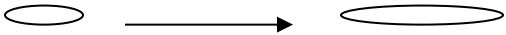


(a) Name the habitat of the plant from which the leaf was obtained. (1mk)

(b) Give two reasons for your answer in (a) above. (2mks)

14. Identify the function of a light microscope as shown by the following diagrams. (2mks)

(a) 

(b) 

15.(a) State three structural differences between arteries and veins. (3mks)

Arteries	Veins

(b) Explain why phloem cells are not lignified like the xylems. (1mk)

16.What is meant by the term habitat.

(1mk)

17.State two ways through which flowering plants hinder self-fertilization from occurring.(2mks)

18.(a)The study of microorganisms is called microbiology. Name any two branches of microbiology.

(2mks)

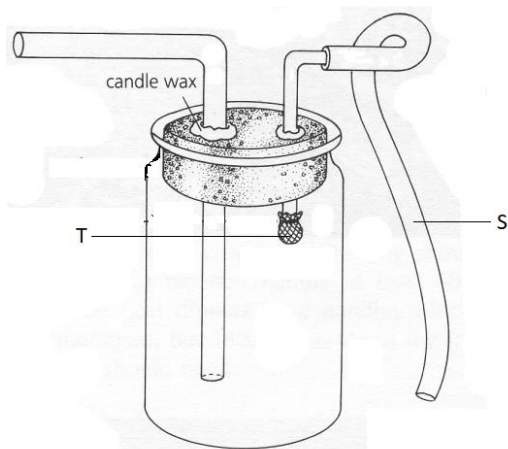
b) Name the branch of biology that deals with the study of the Phylogenetic relationship among organism

(1mk)

19. Below is a drawing of an apparatus used during the study of biology.

a) Identify the apparatus.

(1mk)



b) Name part labelled S and T.

(2mks)

S –

T –

c) State the function of the apparatus.

(1mk)

20. State **one** environmental problem that can be solved by studying biology (1mk)

21. During an experiment it was found out that germinating bean seeds released 9.0 cm^3 of carbon (IV) oxide while 8.8 cm^3 of oxygen was consumed.

a) Calculate the respiratory quotient (2mk)

b) State the type of respiratory substrate. (1mk)

c) State two conditions necessary for maintaining respiration (2mks)

d) Explain the disadvantages of anaerobic respiration in plant roots. (2mks)

22.(a) Name the excretory product removed through guttation (1mk)

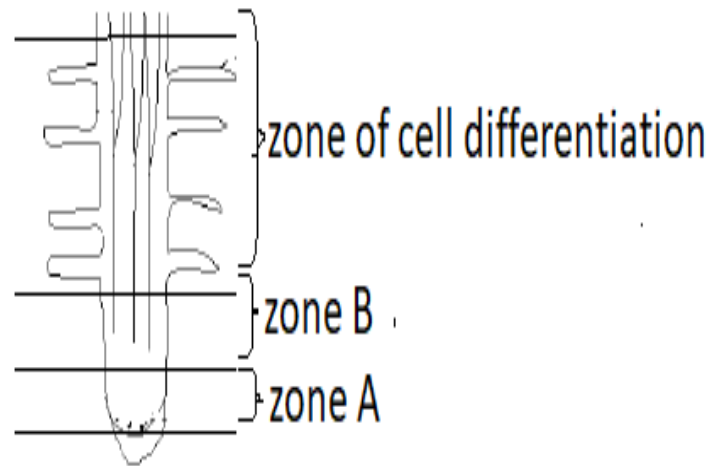
(b) Name the structures in the skin that deals with (2mks)

(i) Temperature regulation

(ii) Excretion

- (c) Seals have very thick layer of fatty tissue under the skin. In what way is this useful to them? (2mks)

23.(a) The diagram below represents the apical growth in a root



- (i) What happens to the cells at zone B (2mks)
- (ii) Name the hormone produced at zone A that brings about a change in zone B (1mk)

24.(a) Name the hormone that sustains the larval stage in insects and the structure that produce it. (2mks)

Hormone -

Structure -

- (b) State the type of growth which occurs in insects. (1mk)

25.(a) What are vestigial structures? (1mk)

- b) The paddles of whales and fins of fish adapt these two organisms to aquatic habitats.

- i. Name the evolutionary process that may have given rise to such similar structures. (1mk)
- ii. What name is given to such structures. (1mk)

26. Name three features that distinguish man from ape even though they are closely related in the evolutionary tree. (3mks)

27. Explain why fresh water protozoa like amoeba do not burst when placed in distilled water (2 marks)

28. State **Two** modifications of stomata which enable a plant to reduce the loss of water. (2mk)