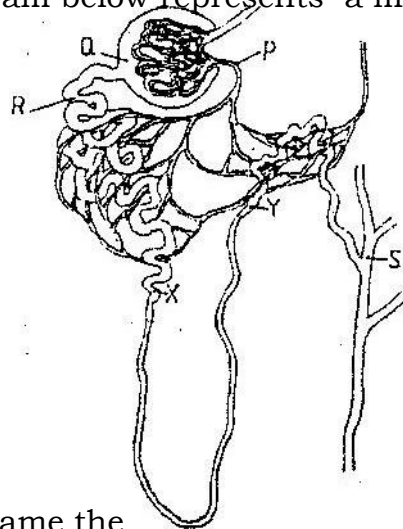


**BIOLOGY PAPER 231 / 1 K.C.S.E 2001**  
**QUESTIONS**

1. Other than having many features in common, state the other characteristics of a species
2. Why are green plants referred to as primary producers in an ecosystem?
3. A person whose blood groups is AB requires a blood transfusion. Name the blood groups of the donors.
4. Name the parts of the flower that are responsible the production of gametes
5. State two functions of muscles found in the alimentary canal of mammals.
6. Adult elephants flap their ears twice as much as their calves in order to cool their bodies when it is hot. Explain.
7. Name the organelle in which protein synthesis takes place
8. (a) The type of circulatory system found in members of the class insecta is  
(b) Name the blood vessel that transports blood from:
  - (i) Small intestines to the liver
  - (ii) Lungs to the heart
9. Name three types of chromosomal mutations
10. Name three sites where gaseous exchange takes place in terrestrial plants.

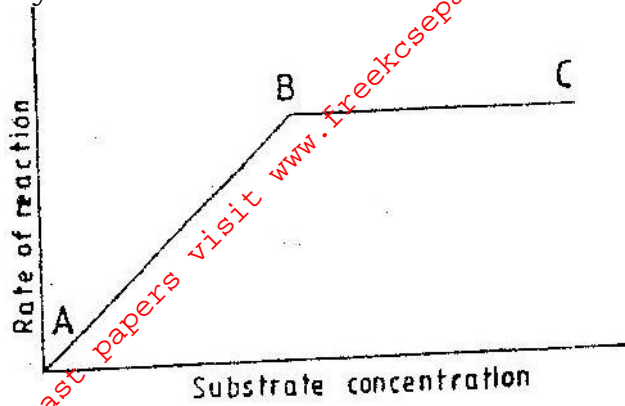
**SECTION B**

11. The diagram below represents a mammalian nephron

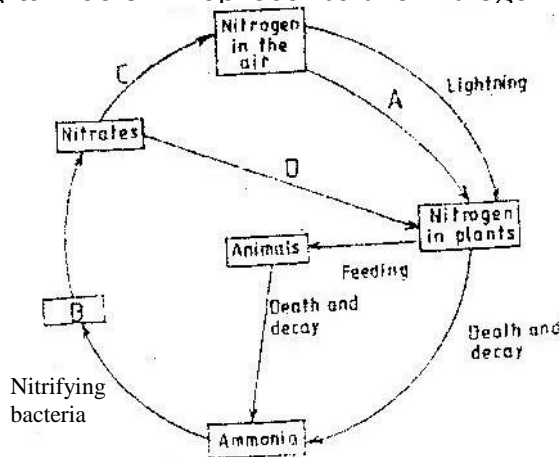


- (a) Name the
  - (i) Structure labeled P
  - (ii) Portion of the nephron between point X and Y
- (b) Name the process that takes place at point Q
- (c) Name one substance present at point R but absent at point S in a healthy mammal
- (d) The appearance of the substance you have mentioned in (c) above is a symptom of a certain disease caused by a hormone deficiency. Name the
  - (i) Disease
  - (ii) Hormone
- (e) State the structural modifications of nephrons found in the desert mammals

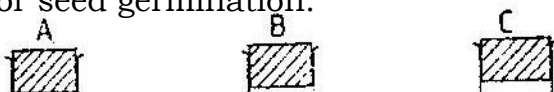
12. The graph below shows the effect of substance concentration of the rate of enzyme reaction.



- (a) (i) Account for the shape of the graph between A and B  
(ii) B and C
- (b) How can the rate of reaction be increased after point B?
- (c) State two other factors that effect the rate of reaction of enzyme reaction
13. The diagram below represents the nitrogen cycle



- (a) State the process labeled  
A  
D
- (b) Name the compound represented by B
- (c) Name the group of organisms labeled C
- (d) (i) name the group of plants which promote process A  
(ii) State the part of the plant where process A takes place
- (e) How would excess pesticides in the soil interfere with process A
14. Tallness in pea plants is due to a dominant gene  
Two tall pea plants were crossed and their F<sub>1</sub> generation were in the ratio of 3 tall: 1 short. Using letter T to represents the gene for tallness and t for shortness give the
- (a) (i) genotype of the parents  
(ii) Gamete of the parents  
(iii) Genotype ratio of the F<sub>1</sub> generation
- (b) What is meant by the term testcross in genetic studies?
15. 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?
- (b) State three reasons for soaking seeds in set ups A and B
- (c) What were the expected results after seven days?

### SECTION C

16. An experiment was carried out to investigate the nutritional value of two dry powder animal feeds X and Y over a period of six months. Twenty 5 month's old castrated goats were used. The goats were divided into two equal groups A and B.

The animals in group A were fed on feed X throughout the experiment while those of group B were fed on feed Y.

The feeds were supplemented with dry hay and water. The average body weight of each group of goats and the weight of the dry powder feeds were determined and recorded each month. The faeces produced by each group was dried and weighed and the average dry faecal output per month was also recorded. The results are as shown below.

|   | GROUP A                             |                                   | GROUP B                                |                                   |                                   |   |
|---|-------------------------------------|-----------------------------------|--|-----------------------------------|-----------------------------------|---|
| Months since commencement of the experiment | Average total weight of goats ( kg) | Average weight of total feed.(kg) | Average monthly dry faecal output (kg) | Average total weight of goats(kg) | Average weight of total feed (kg) | Average monthly dry faecal output ( kg) |
| 0   | 20.4                                | 26.7                              | 10.5                                   | 20.5                              | 35.4                              | 16.5                                    |
| 1   | 22.5                                | 27.5                              | 10.7                                   | 19.5                              | 34.3                              | 17.7                                    |
| 2   | 24.5                                | 25.8                              | 10.3                                   | 19.0                              | 35.2                              | 17.2                                    |
| 3   | 26.3                                | 18.5                              | 8.8                                    | 18.5                              | 36.1                              | 17.5                                    |
| 4   | 28.0                                | 16.6                              | 7.2                                    | 17.1                              | 36.0                              | 16.9                                    |
| 5   | 29.4                                | 16.3                              | 6.0                                    | 16.3                              | 35.8                              | 16.8                                    |
| 6   | 29.5                                | 16.1                              | 5.6                                    | 15.6                              | 35.5                              | 16.6                                    |

- (a) (i) What is the relationship between the amount of feed and the faecal output
- (ii) Work out the average increase in weight for the animals in group A during

The first four months

The last two months

(iii) Account for the average increase weight in goats in group A during the first four months

The last two months

(iv) Which of the two feeds is more nutritious?

Give reason for your answer

(b) State four uses of digested food in the bodies of animals

(c) State four uses of water in the bodies of animals

17. (a) State the functions of the following parts of the mammalian ear;

(i) Tympanic membrane

(ii) Eustachian tube

(iii) Ear ossicles

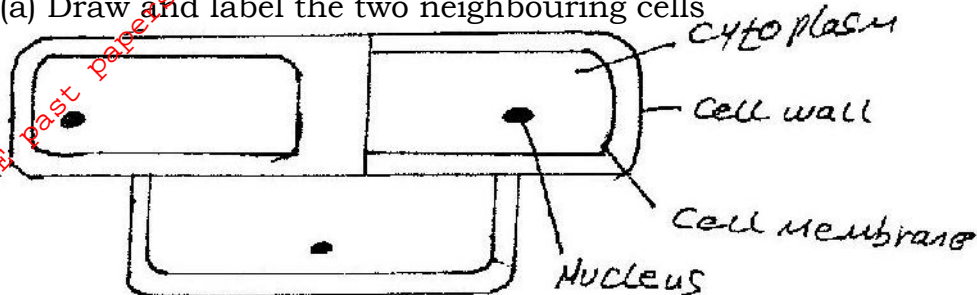
(b) Describe how semicircular canals perform their functions

18. (a) Describe the process of fertilization in a flowering plant

(b) State the change that take place in a flower after fertilization

**BIOLOGY PAPER 231/2 K.C.S.E 2001  
PRACTICAL MARKING SCHEME**

1. You are provided with a portion of the onion bulb. Remove one fleshy leaf from the portion. Peel the epidermis from the inner surface of the leaf. Place it in a drop of water on a slide. Place a cover slip on the epidermis. Place one drop of iodine solution at one edge of the cover slip. Using a blotting paper drain of excess iodine solution and water from the opposite edge of the cover slip. Observe the epidermis under low power, then under medium power.
- (a) Draw and label the two neighbouring cells



Accuracy:

- Outline continuous
- Cell elongated
- Double line
- Nucleus placed side
- No shading
- Mag x 20 x 25 x 40 x 50 x 60 x 75 x 100 x 150 x 225

- (b) Why is the staining of the epidermis necessary?
- To make different part of the cell distinct
- (c) Work out the length and the width of one cell as seen under medium power.

$$\begin{aligned} \text{Diameter field of view} &= (1-2 \text{ mm}) \\ &= 1000(1-2) \text{ cm} \end{aligned}$$

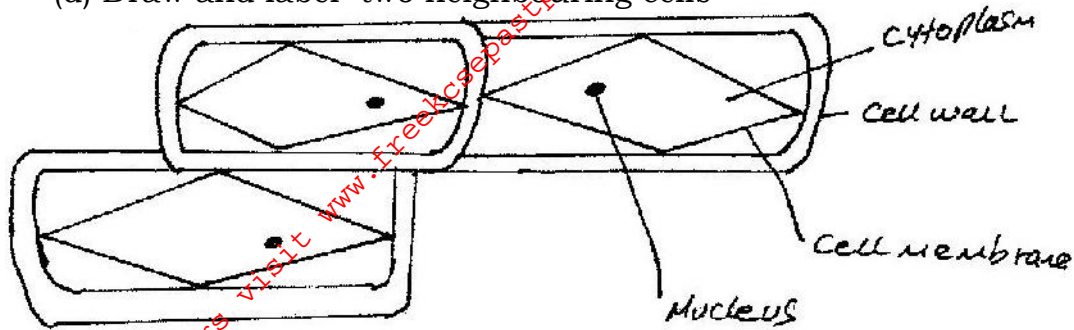
Number of cells in the field of view = 10 – 20 across width

$$\begin{aligned} \text{Width of one cell} &= \frac{100(1-2)}{(10 - 20)} \end{aligned}$$

$$\begin{aligned} \text{Length of one cell} &= \frac{100(1-2)}{(3-5)} \end{aligned}$$

Place a drop of liquid L at the edge of the cover slip. Drain the liquid from the opposite edge to allow it flow across the epidermis. Leave the set up for about five minutes. Observe under medium power.

(d) Draw and label two neighbouring cells



Account for the results in (d) above

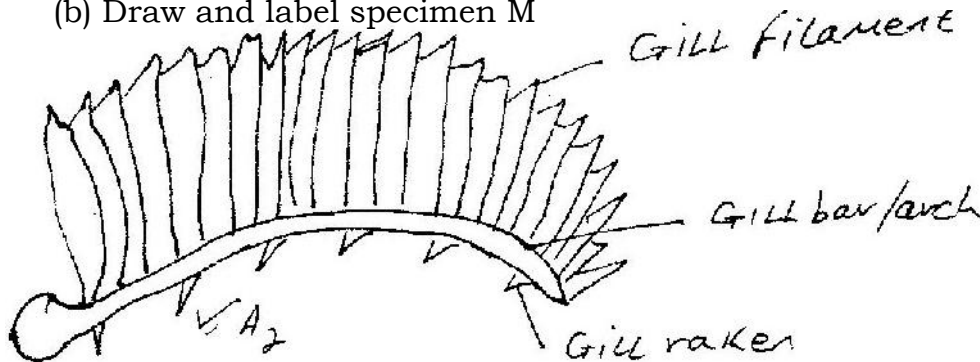
Liquid is hypertonic (owwte) water is drawn out of the cell by osmosis making the cytoplasm membrane shrink plasmolysed.

2. You are provided with specimen labelled M and N. examine them.

(a) Identify the specimens and state the organism from which they were obtained

| <u>Specimen</u> | <u>Part</u>      | <u>Organism</u> |
|-----------------|------------------|-----------------|
| M               | Gills/fish gills | Fish            |
| N               | Piece of lung    | mammal          |

(b) Draw and label specimen M



Accuracy – continuous outline- three parts of gills drawn

No shading – Three parts gills drawn proportionality

(c) Using observable features only, explain how specimen M is adapted to its function

- Many/ numerous/ several gill filaments to increase surface area of gaseous exchange/ absorption of oxygen.
- Filament to reduce distance through which gas diffuse
- Gill bar to provide form of support or attachment of gill filament/ gill rakers
- Gill rakers prevent particles from reaching gill filament
- Long filaments increases surface area for gaseous

(d) State three distinguishing features of specimen N

Presence of bronchioles/ alveolar ducts/ pleural/ membrane, spongy/ air spaces

(e) State the functional relationship between specimens M and N

- Both for gaseous exchange

3. You are provided with specimens labelled P1, P2, P3, P4, P5 and P6. A dichotomous key shown below can be used to identify them.

1. (a) Leaves simple go to 2  
 (b) Leaves compound Cassia
2. (a) Leaves green go to 3  
 (b) Leaves purple Tradescantia
3. (a) Leaves parallel veined Zea  
 (b) Leaves net veined go to 4
4. (a) Leaf margin serrated go to 7  
 (b) Leaf margin smooth go to 5
5. (a) Leaves hairy Solanum  
 (b) Leaves not hairy go to 6
6. (a) Leaves ovate bouganvillea  
 (b) Leaves lanceolate Mangifera
7. (a) Leaves fleshy go to 8  
 (b) Leaves not fleshy Hibiscus
8. (a) Leaves with pointed tip Kalanchoe  
 (b) Leaves with rounded tip Bryophylum

- (a) Use the dichotomous key to identify each of the plant specimens provided. In each case show the sequence the steps. (e.g 1a, 2b, 5b etc) In the key that have followed to arrive at the identity of each specimen.

| Specimen | Steps Followed         | Identity      |
|----------|------------------------|---------------|
| P1       | 1a, 2a, 3b, 4a, 7a, 7b | Bryophylum    |
| P2       | 1a, 2b                 | Tradescantia  |
| P3       | 1a, 2a, 3b, 4b, 5b, 6a | Bougainvillea |
| P4       | 1a, 2a, 3b, 4b, 5b, 6b | Mangifera     |
| P5       | 1a, 2a, 3b, 4b, 5a     | Solanum       |
| P6       | 1a, 2a, 3a             | Zea           |

- (b) (i) Name the likely habitat of specimen P1  
 Arid/ semi arid/ desert/ dry areas/ dry land
- (ii) Give a reason for your answer in (i) above  
 Fleshy/succulent/ (leaves) juicy/ thick cuticle
- (c) State the significant of the shiny upper surface of specimen P4  
 - To reflect away sun rays  
 - To reduce transpiration/ water loss
- (d) Observe the floral parts of specimen P3. What is the significance of the brightly coloured structures onto which the flowers are attached?  
 - To attract insects (pollination)
- (e) Name two features that make specimen P5 adapted to its environment.  
 - Hairy (to reduce water loss)  
 - Presence of thorn/ spines/ spikes
- (f) Name a feature that is used to classify P6 as monocotyledonous plant  
 - Parallel veins/ veins/ arrangements of veins  
 - Presence of sheath/ leaf sheath.