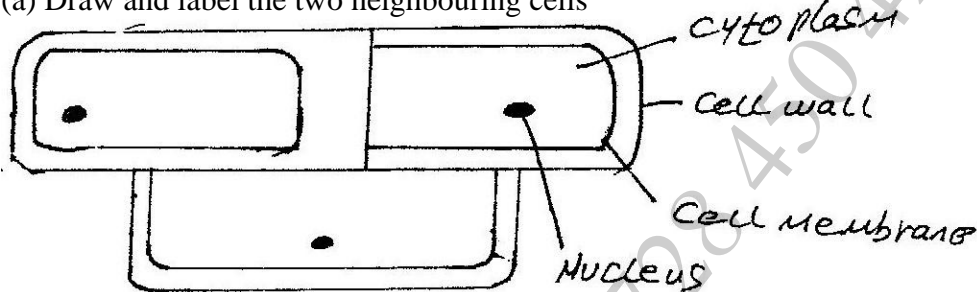


**BIOLOGY PAPER 231/2 K.C.S.E 2001  
PRACTICAL MARKING SCHEME**

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.

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

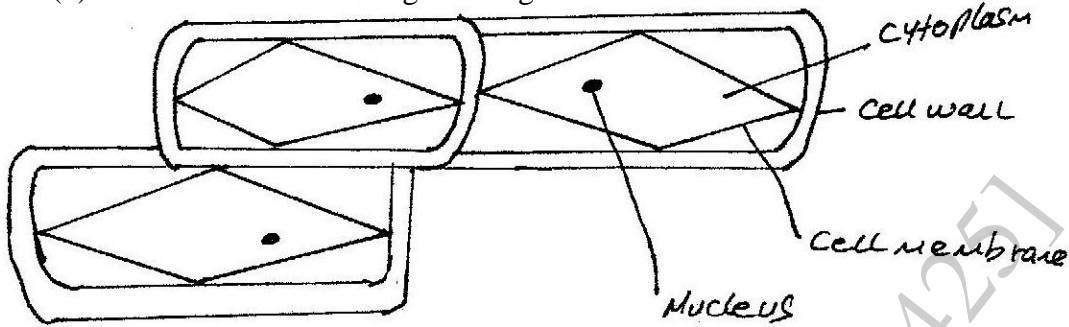
Number of cells in the field of view = 10 – 20 across width

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

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

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

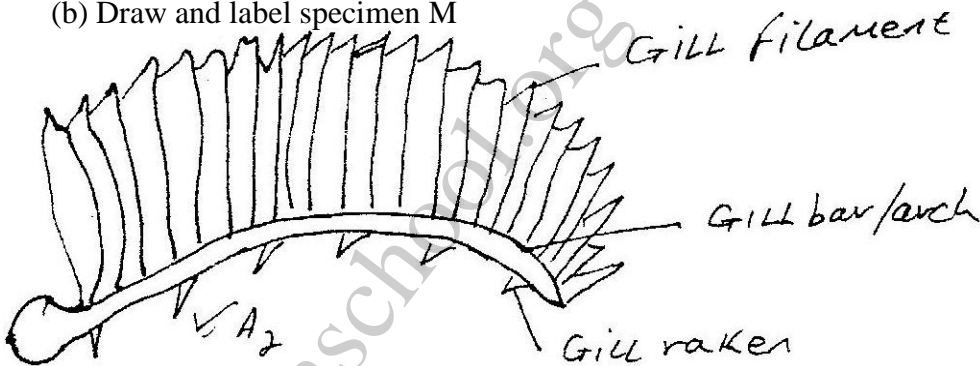
Liquid is hypertonic (owwte) water is drawn out of the cell by osmosis making the cytoplasm membrane shrink plasmolysed.

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            | bougainvillea |
|    | (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 | Bryophyllum   |

- (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 t arrive at the identity of each specimen.

Specimen	Steps Followed	Identity
P1	1a, 2a, 3b, 4a, 7a, 7b	Bryophyllum
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.