BIOLOGY PAPER 231/2 KCSE 1996
PRACTICAL MARKING SCHEME.

1. Confidential requirement: Specimen D – 'sukuma wiki' kale.

You are provided with a specimen labelled D, which is part of a plant.

a) (i) Using external features only, identify the part of plant leaf.

(ii) Give three reasons for your answer in a (i) above.

-Leaf blade / lamina

-Presence of petiole / mid – rib / leaf stalk.

-Presence of veins Rej; venation

b) Peel off the epidermis of the lower surface of the specimen. Mount a portion of the epidermis in a drop of water on a microscope slide. Stain with methylene blue, cover slip, observe the specimen under high power objective and count the number of stomata in the field of view. Record the number of stomata in the table below. Repeat the counting of stomata two times, each time moving the slide to another field of view. Record the number of stomata for each field of view in the table.

Field of view	**Number of stomata in**	**Each field of view**
	Lower	Upper epidermis
1. High power	28	13
2. High power	33	12
3. High power	30	13
Average number of stomata	A-	A(Must be lower than that of upper epidermis)

Ref: Average if at least one count is wrong.

c) Repeat the procedure in (b) above using a peeling of the upper epidermis. Record the number of stomata in the table.

d) Record the following from the microscope you used to count the stomata.

(i) Magnification of eyepiece lensx10/x15

(ii) Magnification of objective lens used x40 / x45

(iii) From the data in d(i) and (ii) above, calculate the total Magnification. Show your working.

May = Eye x Objective

10x40 =400

15x45 = 675(Rej if working is not shown.)

e) Account for the average number of stomata on each side of the specimen.

Upper epidermis- fewer stomata / reduce transpiration / water loss / rate of evaporation / exposed to direct sunlight.

Lower epidermis – more to increase rate of gaseous exchange // allow more gaseous exchange / more stomata away from the sun to reduce rate of transpiration.

2. You are provided with a specimen labeled H, which is a piece of mammalian intestine. Squeeze the contents in the lumen into a test tube. Add 3ml of water and shake the contents.

Reserve the piece of intestine for question (b)

a) (i) Use the reagents provided to test for the presence of

Starch, proteins and reducing sugars in the contents. Record the procedures, observations and conclusions in the table below.

Food substance	**procedure**	**Observations**	**Conclusion**
Starch	Iodine solution added drop wise		
Proteins	Add NaOH to solution then copper sulphate (1%) /CuSO4 +NaOH	Violet / purple colour observed	Reducing sugars
Reducing Sugars		Colour changes from Blue – green – yellow-orange / Red ppt/Brick red ppt. Acc any of the colour.	Reducing sugars present

(ii) Account for the results obtained in (a) (i) above
-No starch because it has been
Digested / converted / broken / changed to simple / reducing sugar.
-Reducing sugar present / incomplete digestion of protein
-Digestion / incomplete absorption.
No link / tied with table.

b) Cut specimen H along its length to expose the inner surface.

(i) Feel the inner and outer surfaces of the specimen. Record your Observations.
Inner surface-
Slimmy / slippery / wavy / undulating / protrusion / projections/folds/s wellings / lumps Rej: rough
Outer surface: Smooth

(ii) Account for your observations of the inner surface.
-Slimmy due to presence of mucus secreted by intestinal walls to protect walls from enzyme digestion / lubricate the walls.
-Projections – presence of villi / finger like structure; for absorption of food / folds to increase surface area for absorption.

3. Confidential requirement J: Fish /Tilapia

You are provided with a specimen labeled J.

a) Using observable features only, identify the class to which the specimen belongs.
-Class Pisces (Rej Fish (es)

Use the observable features used to identify the class, which the Specimen belongs.

(i) Presence of fins
(ii) Presence of scales / overlapping
(iii) Present gills/operculum
(iv) Presence of lateral line

b) Stroke the specimen on the lateral side from the head end to the tail end. Repeat the stroking from tail end to head end.

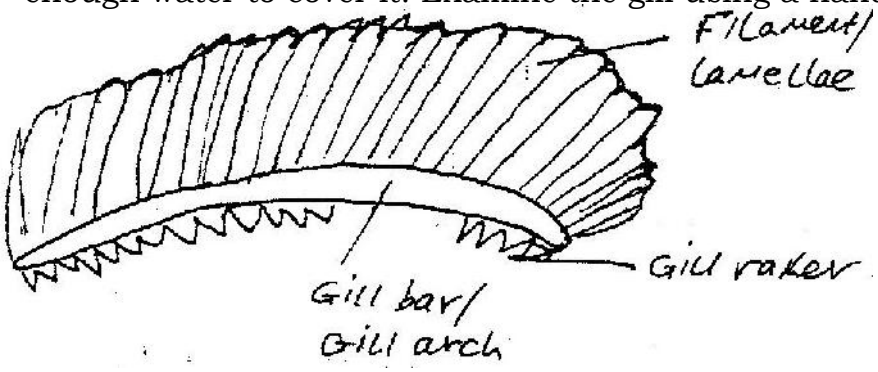
(i) Record your observations
Tail – head – Rough
Head – tail – Smooth

(ii) Observe the arrangement of the scales .Record your Observations
-Scales overlap
-Free ends point backwards (owwte)

(iii) State the significance of the arrangement of the scales.
- minimize / reduce friction (during motion)
- Prevent water contact with body / skin
- Protection

(Rej (iii) if (ii) is wrong.

c) Cut and remove the operculum to expose the gills. Remove one complete gill from the specimen and place it in a Petri dish containing enough water to cover it. Examine the gill using a hand lens.



Gill filament -Closed a top
-Arranged closely
-Proportionality
-Origin, gill bar

Gill bar -Continuous lines
-Curved
-Closed both ends

Gill rakes -Serrated
-Close to one another
-Origin – gill bar
-No shading

(ii) How is the gill adapted to its function?
-Many/numerous gill filaments to increase surface area for gaseous exchange.
-Extensive vascularisation / many capillaries /blood vessels; for gaseous exchange.
-Presence of rakers to filter / trap solid particles, which might damage the gill filaments.
-Gill bar / arc / is bonny / cartilaginous / bony / hard / firm for support / attachment gill filaments and / or strong rakers.
-Thin filaments; to facilitate diffusion of gases / to shorten distance for diffusion of gases.