

F151D

THE KENYA NATIONAL EXAMINATIONS COUNCIL  
Kenya Certificate of Secondary Education

231/3

Paper 3

**BIOLOGY – (Practical)**

Dec. 2022 – 1¾ hours



Name ..... Index Number .....

Candidate's Signature ..... Date .....

Co-ordinated  
Marking scheme  
F151D BUNYARUKA (KERIC)

**Instructions to Candidates**

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) Answer **all** the questions in the spaces provided.
- (d) You are required to spend the first 15 minutes of the 1¾ hours allowed for this paper reading the whole paper carefully before commencing your work.
- (e) Additional pages must **not** be inserted.
- (f) **This paper consists of 7 printed pages.**
- (g) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (h) **Candidates should answer the questions in English.**

**For Examiner's Use Only**

Question	Maximum Score	Candidate's Score
1	13	13
2	14	14
3	13	13
<b>Total Score</b>	<b>40</b>	<b>40</b>

Monocopyed

Access free revision content at [www.freekscepapers.com](http://www.freekscepapers.com)

KCSE 2022

149

C000



317085

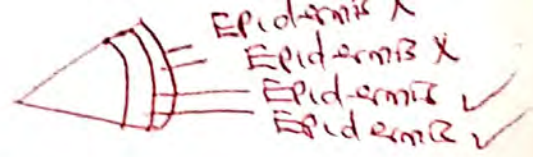
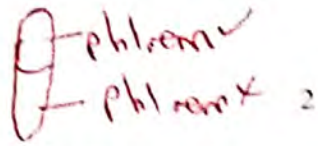
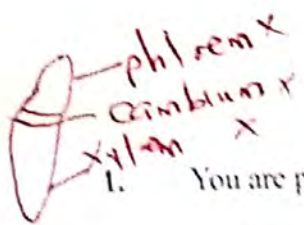
© 2022 The Kenya National Examinations Council

231/3



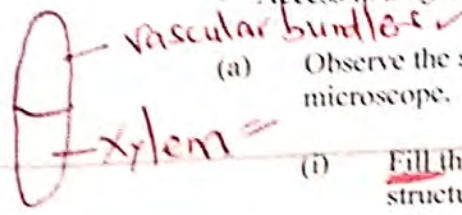
Turn over





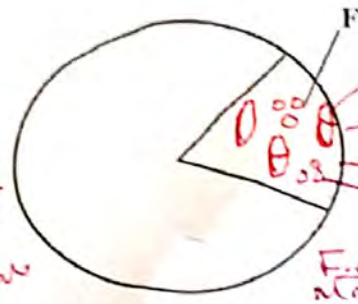
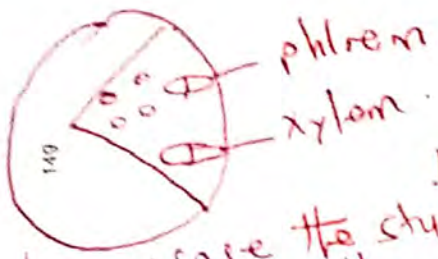
You are provided with the following material and apparatus:

- A prepared slide, labelled E containing the transverse section through a plant organ.
- Access to a light microscope with at least the low and medium power objective lens.



(a) Observe the section under the low power and medium power objective lens of the light microscope.

(i) Fill the portion, labelled F in the plan diagram below to show (a portion of) the structures seen under the medium power objective of the light microscope. Label the structures.



- Vascular bundle (3 marks)
- D-1
  - L-2
  - Epidermis
  - ground tissue
  - parenchyma cell.

N/B increase the student draws outside the demarcated line for

Figure 1.1: section of drawing  
- outline should be continuous  
- no shading - outline can be single/double line

(ii) Calculate the magnification of the image observed under low power objective lens.

N/B Eye piece magnification should range between X5 - X15 while objective magnification X10 - X100

Magnification = low power objective lens magnification × eye piece lens magnification

$$= X4 \times X5 = X20$$

$$= X4 \times X5 = X20$$

$$= X4 \times X5 = X20$$

Acc. error without formula Range (X10 - X150)

(b) With reference to one observable feature, state the Class of plants from which the organ was obtained. (2 marks)

Monocotyledonous plant  
Monocot

vascular bundles scattered in the cortex irregularly/randomly arranged

(c) Name the plant part from which the section was obtained. (2 marks)

stem; / Monocot stem

(d) State two precautions one should take to ensure the safety of the slide during observation under the microscope. (2 marks)

(Firmly) hold slide on the stage with clips  
Never use the coarse/rough adjustment knob with high power objective / medium power objective lens

Use the coarse adjustment knob with low and medium power objective lens



use fine adjustment knob when using high power objective lens; the slide; 6  
 Avoid breaking the slide; 6  
 Mark any first time

✓/1/3  
 For one to score mark the destination path/direction must

(e) State how each of the following parts of the light microscope contributed to clarity of the image of the section observed. (3 marks)

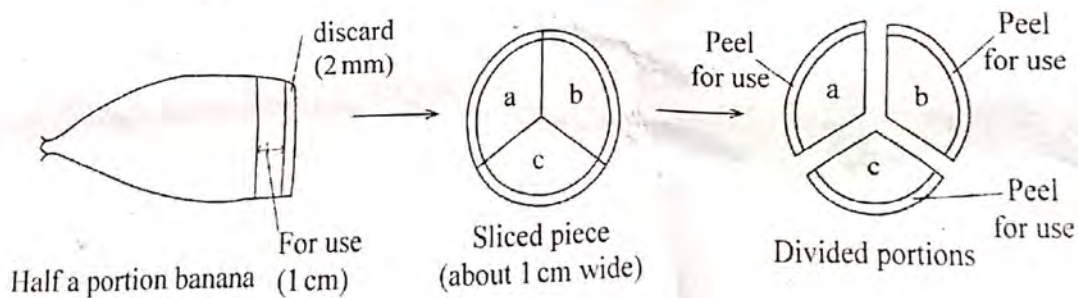
- (i) Mirror - Reflects light onto stage/slide/specimen/into the microscope. ✓ reflects light only falling/landing/reaching the object/specimen/slide
- (ii) Diaphragm - controls/regulates the amount of light passing through the condenser/onto stage/slide, the stage/specimen/slide
- (iii) Condenser - A.C.C. Condenses light onto stage/slide. ✓ concentrates light onto the object/stage/slide

2. You are provided with the following materials and reagents.

- Half a portion of raw banana
- 3 beakers labelled G, H and J treated as follows:
  - Beaker G contains 50 ml of dilute hydrochloric acid
  - Beaker H contains 50 ml of distilled water
  - Beaker J is empty
- Scalpel
- Spatula/pair of forceps
- A white plain paper or white tile
- Stopwatch/means of timing

When some plant tissues are exposed, enzymes on the exposed surfaces react with oxygen. Using the provided materials, investigate the enzyme-oxygen reaction using the procedure below.

- I. Slice off about 2mm from the exposed end of the raw banana and discard the slice.
- II. Slice another piece, about 1 cm wide from the remaining banana to use in the investigation.
- III. Divide the portion obtained in (II.) above into three parts (a, b and c) as illustrated in the diagram below.





Sus Pencil -

- IV. Remove the peel from portion **a**, cut the peel into three pieces and immediately drop all the three pieces into beaker **G** (containing hydrochloric acid). Obtain peels **only**, without remnants of banana flesh.
- V. Repeat procedure IV with peels from portion **b** into beaker **H** (containing distilled water) and those from portion **c** into beaker **J**.
- VI. Leave the set-up for five minutes and observe the inner surfaces of the banana peels in each beaker.

(a) (i) Record the observations made in each case. (3 marks)

149

reject Acc. R. green colour  
Browns green peels  
Browns black patches

**G** white/cream/yellow/yellowish white/cream yellow  
whitish yellow/ no colour change/ colour remains same

**H** (little) brown/ (less) colour changes/ black colour/ blackening  
Browning/ grey/ gray

**J** (More) brown/ blackening/ black/ Browning/ grey/ gray/  
(More) colour change oxidized

(ii) Account for the observations made in beakers **H** and **J**.

Beaker **H** (2 marks)  
water covered the surface of banana peel  
diluted / decreased the enzyme / hence less oxygen  
(enzyme / air / oxygen) reaction, hence less

Beaker **J** (2 marks)  
browning / blackening / black / less

The peeled surface was (fully) exposed to the (atmospheric) air / oxygen hence maximum (enzyme / air) reaction resulting in (more) colour change.

VII. Using the spatula/pair of forceps provided, remove the peels from each beaker and expose the sets of peels separately on the plain paper/white tile provided. Leave them for a further five minutes and observe.

(b) (i) Record the observations made on the peels from beakers **H** and **J**.

**H** little brown / black / grey / black (1 mark)

**J** colour remained brown / black / gray (1 mark)  
colours for 2(a) J apply



(ii) Account for the observations on the surfaces of peels from beakers G and J after a further 5 minutes.

G No colour change / white / cream / yellow / cream-yellow / yellowish white / whitish yellow; the acid / low pH dilute HCl denatured / destroyed enzymes is killed (1 mark)

J The enzymes on the surface of the peel were (fully) exposed to the atmospheric air / oxygen had Acc. Exposed to optimum suitable / favourable / best pH (1 mark)

(c) Suggest the suitable pH for the enzymes found on the surface of the banana peels. (1 mark)  
Neutral / 7.0 / slightly alkaline / basic; acc. specific pH between 7-9.4

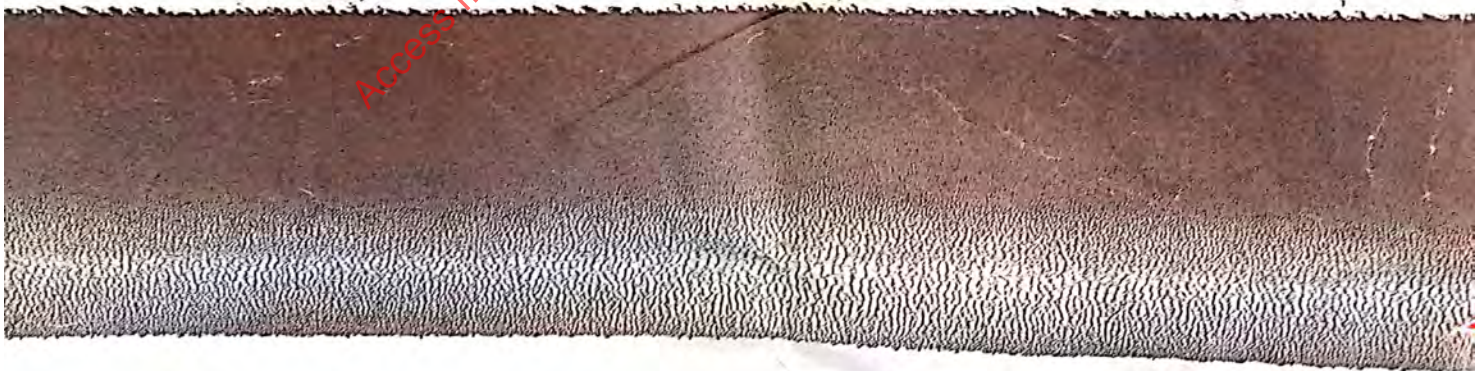
(d) Suppose the peels in set up J were initially boiled for 5 minutes. (1 mark)  
(i) Suggest the observations that would have been made. No colour change acc. white / cream / yellow; is

(ii) Explain the observations made in (d)(i). (1 mark)  
Boiling denatures / destroys enzymes; is boiling killed enzyme

149

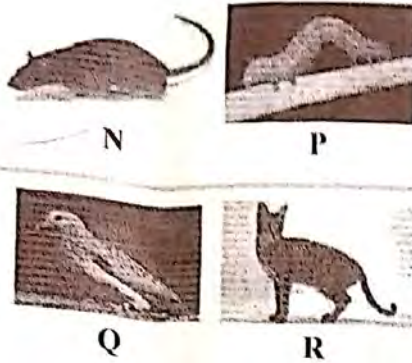
CCO

Access free revision content at www.deekcsepapers.com



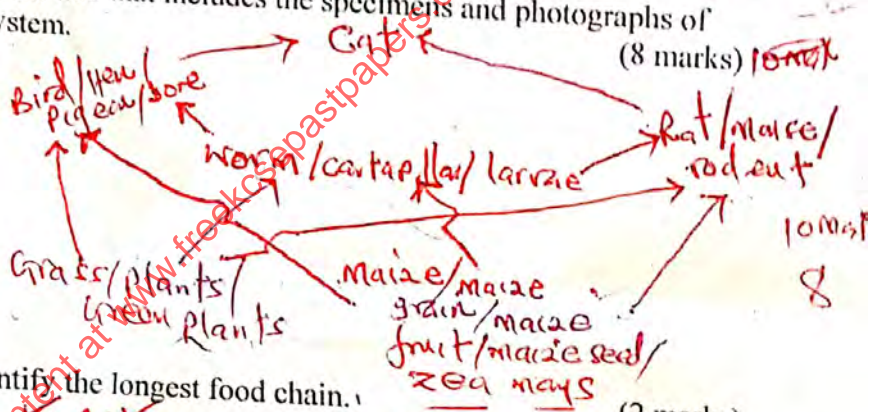
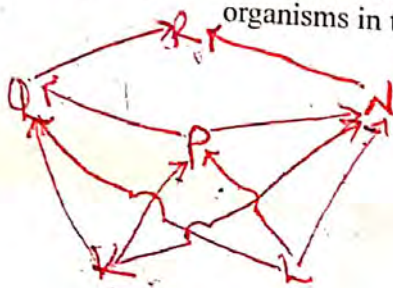


3. You are provided with specimens labelled K and L together with photographs of organisms labelled N, P, Q and R.



Assuming the organisms are found in the same ecosystem:

(a) (i) Construct a complete food web that includes the specimens and photographs of organisms in this ecosystem. (8 marks)



(ii) From the food web, identify the longest food chain. (2 marks)

- Acc. Small letters and pictures for the food chain
- K → P → N → R ✓
- K → P → Q → R ✓
- K → P → N → R ✓
- K → P → N → R ✓
- R ← Q ← P ← K ✓

Monocotyledonae

$$\begin{array}{r} 36 \\ 82 \\ \hline 118 \\ 40 \\ \hline 158 \end{array}$$

$$\begin{array}{r} 158 \\ 29 \\ \hline 187 \\ 61 \\ \hline 248 \end{array}$$

$$\begin{array}{r} 248 \\ 144 \\ \hline 392 \end{array}$$



Identify the organisms with the highest biomass.

(1 mark)



(b) (i)

Grass/specimen K; / maize/K;

(ii)

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

(1 mark)

it is a producer/manufactures own food/maizes manufactured food

(c) Other than feeding, explain how the organism represented in photograph R benefits from specimen K.

(1 mark)

- K releases oxygen to be used by specimen R (during respiration)

- K Purifies/clears the air by using up CO<sub>2</sub> exhaled/produced by specimen R (during photosynthesis)

(12)

- specimen K is a habitat/home for specimen R

- specimen K is a habitat for other organism that R feeds on

specimen K is a hideout for specimen R to get its prey/escape danger/predators/ breeding hideout

- K is used by R for stalking its prey

R's camouflage

Access free revision content at www.freekcsepapers.com

4021

8 | 3219  
32

1540  
1679

THIS IS THE LAST PRINTED PAGE.

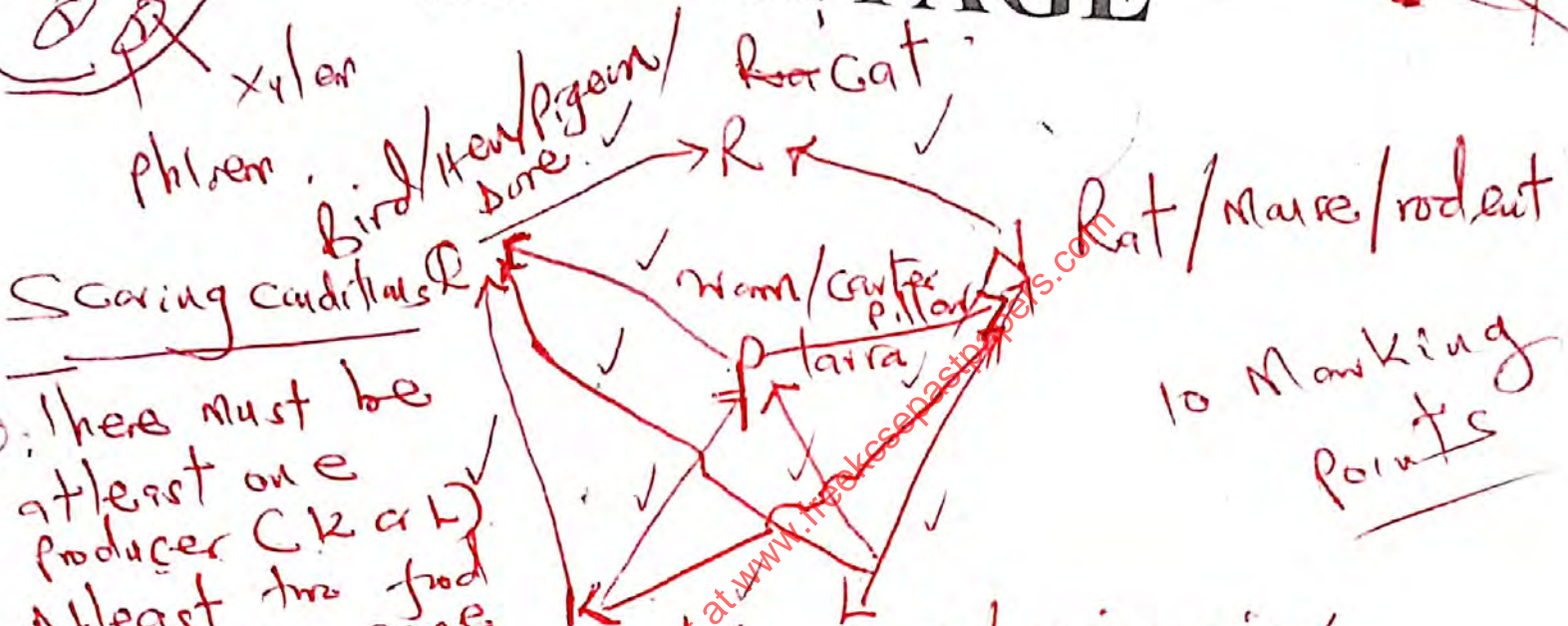
19  
16

Kenya Certificate of Secondary Education, 2022

3219



# BLANK PAGE



(ii) There must be at least one producer (K or L).  
 At least two food chains (can come from one producer) Grass/Plants/Green plants

10 Marking points

if any of those lines are dotted/bulleted does not have an arrow / Arrow point the eater.  
 if specific identity of ~~species~~ drawings - sketches

maize / maize grain / maize fruit / maize seed / Zea mays

Acc. - scientific names if binomial rules are followed  
 pictorial food webs - ignore plurals