

Signature:

| Random No. | | | | | Personal No. | | |
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(Do not write your School/Centre Name or Number anywhere on this booklet.)

P530/3
BIOLOGY
Paper 3
(Practical)
Nov./Dec. 2024
3¼ hours



UGANDA NATIONAL EXAMINATIONS BOARD
Uganda Advanced Certificate of Education

BIOLOGY

Paper 3
(Practical)

3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

*This paper consists of **three** questions.*

*All questions are **compulsory**.*

*Write the answers in the spaces provided. **No** additional sheets of paper should be inserted in this booklet.*

*You are **not** allowed to start working within the first **15** minutes. You are advised to use this time to **read** through the paper and ensure that you have all the apparatus, chemicals and specimens you require.*

| For Examiners' Use Only | | |
|-------------------------|-------|----------------------------|
| Question | Marks | Examiner's Signature & No. |
| 1 | | |
| 2 | | |
| 3 | | |
| Total | | |

1. You are provided with specimen X which is freshly killed.

(a) Examine the head of specimen X and describe the structure and location of the following:

(i) Vibrissae (whiskers).

(03 marks)

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(ii) Eyes.

(1½ marks)

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(iii) Pinnae.

(03 marks)

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(b) How significant is the location of the following structures in the life of specimen X?

(i) Vibrissae.

(02 marks)

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(ii) Eyes.

(1½ marks)

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- (c) Dissect the abdominal cavity of specimen X to expose the structures in the viscera. Displace the liver lobes anteriorly to expose the underlying structures without displacing the stomach. Cut the rectum at the base, pull it upwards and pin it to the right side of the specimen. Locate the duodenum, caecum and ileum. Displace the duodenum and caecum to the right side of the specimen and the ileum to the left side of the specimen. Draw and label the displayed structures of the alimentary canal of the abdominal cavity up to the pinned rectum including the mesenteric structures attached to the small intestine.

(17 marks)

- (d) With the stomach displaced to the right side of the specimen, draw and label the organs lying between the anteriorly displaced liver lobes and the posterior end of the duodenum. Include the blood vessels that supply the structures displayed. (12 marks)

2. You are provided with seedlings/seeds of five different lots labelled **A, B, C, D** and **E**, which have been grown for different lengths of time. You are required to investigate the effect of growth activities on the chemical components of the seed/seedlings using the following procedures:

- (a) (i) Label 5 petri dishes **A, B, C, D** and **E**.
- (ii) Obtain 10 seedlings/seeds from each lot and place them in the respective petri dishes labelled **A, B, C, D** and **E**.

- (iii) Using a clean mortar and pestle, thoroughly pound the seedlings from petri dish A. Add 15 cm³ of distilled water, stir well and decant into a clean boiling tube and label it extract A₁. Pour the residue into the plastic mug / beaker provided.
- (iv) Repeat the procedures (a)(i) – (iii) using the remaining seed/seedling lots to make corresponding extracts B₁, C₁, D₁ and E₁.
- (b) (i) Carry out tests in table 1 to determine the food nutrients in extracts C₁ and D₁. Record your test procedures, observations and deductions in the table.

Table 1

(14 marks)

| Test procedure | | Observations | Deductions |
|------------------------|----------------|--------------|------------|
| <u>Iodine test</u> | C ₁ | | |
| | D ₁ | | |
| <u>Benedict's test</u> | C ₁ | | |
| | D ₁ | | |
| <u>Biuret test</u> | C ₁ | | |
| | D ₁ | | |

- (ii) Basing on your results in table 1, name the extract which was obtained from the seedling that had grown for a longer time. (01 mark)

- (iii) Explain your observations in table 1. (02 marks)

- (c) (i) Obtain five clean test tubes of the same size, label them A_2 , B_2 , C_2 , D_2 and E_2 and place them in a test tube rack.
- (ii) To each of the labelled test tubes A_2 , B_2 , C_2 , D_2 and E_2 , measure and pour 1 cm^3 of solution Q.
- (iii) Add 1 cm^3 of A_1 into the test tube A_2 and immediately start the stop clock.
- (iv) After 30 seconds, using a ruler, measure in centimetres the height of the contents in the test tube A_2 .
- (v) Record your measurement in table 2.
- (vi) Repeat procedures (c)(iii) – (v) using extracts B_1 , C_1 , D_1 , E_1 and the corresponding contents of test tube B_2 , C_2 , D_2 and E_2 .

Table 2

(05 marks)

| Extract | Height of contents after 30 seconds (cm) |
|---------|--|
| A_1 | |
| B_1 | |
| C_1 | |
| D_1 | |
| E_1 | |

(d) (i) Represent your results in table 2 on a suitable graph. (08 marks)



(ii) Explain the results plotted in (d)(i).

(04 marks)

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3. You are provided with specimens V, W, Y and U.

(a) Examine specimens V, W, Y and U.

(i) Identify **two** distinctive features of the leaves and roots of each of the specimens and record your observations in table 3.

Table 3

(07 marks)

| Specimen | Distinctive Features Observed | |
|----------|-------------------------------|-------------------------|
| | Leaves | Roots |
| V | | |
| W | | |
| Y | | |
| U | | |

- (ii) Using the features in table 3, construct a dichotomous key for the identification of specimens V, W, Y and U. (03 marks)

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- (b) Explain the significance of any **two** common observable features unique to both specimens W and Y. (02 marks)

(i)

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(ii)

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- (c) (i) Peel off the lower epidermis of a fleshy leaf of specimen W. Place it on a glass slide, add 1 – 2 drops of distilled water and cover with the cover slip. Observe under low power of a light microscope and describe the appearance of the observed structures within the field of view. (03 marks)

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- (ii) Obtain a thin transverse section at the fourth internode towards the apex of specimen U. Place it on a glass slide, add 1 ~ 2 drops of iodine solution and cover it with a cover slip. Allow it to stand for 3 minutes and observe under low or medium power of a light microscope.

Draw and label the observed structures.

(08 marks)

- (iii) State how any **three** observed structures in (c)(ii) are suitable for their functions.

(03 marks)

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