

Candidate's Name:

Signature:

Random No.					Personal No.		

(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)

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- (iii) Explain your observations in table 1.

(02 marks)

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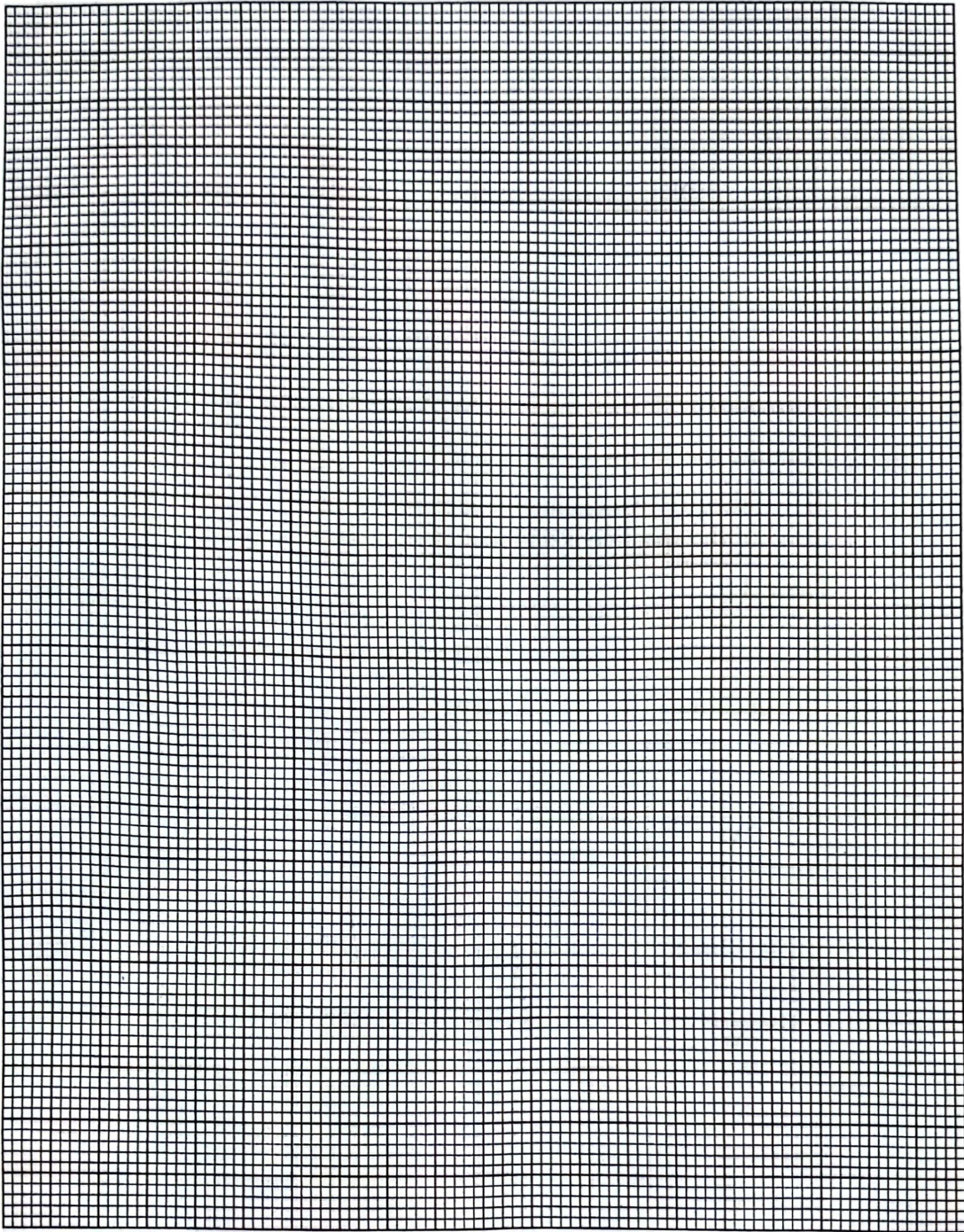
- (c) (i) Obtain five clean test tubes of the same size, label them **A₂**, **B₂**, **C₂**, **D₂** and **E₂** and place them in a test tube rack.
- (ii) To each of the labelled test tubes **A₂**, **B₂**, **C₂**, **D₂** and **E₂**, measure and pour 1 cm³ of solution **Q**.
- (iii) Add 1 cm³ of **A₁** into the test tube **A₂** 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 **A₂**.
- (v) Record your measurement in table 2.
- (vi) Repeat procedures (c)(iii) – (v) using extracts **B₁**, **C₁**, **D₁**, **E₁** and the corresponding contents of test tube **B₂**, **C₂**, **D₂** and **E₂**.

Table 2

(05 marks)

Extract	Height of contents after 30 seconds (cm)
A₁	
B₁	
C₁	
D₁	
E₁	

- (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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Each candidate should be provided with the following:

A freshly killed rat, labelled **X**.

15 maize seedlings germinated for 24 hours, labelled **C**.

15 maize seedlings germinated for 72 hours, labelled **B**.

15 maize seedlings germinated for 48 hours, labelled **A**.

15 maize seedlings germinated for 12 hours, labelled **E**.

15 maize seedlings germinated for 108 hours, labelled **D**.

(Each of the maize seed lots are first soaked in water for 12 hours then planted on moist cotton wool. **Begin** counting the germination time when the seeds are planted on the cotton wool.)

10 cm³ of 1 % amylase solution, labelled **F**.

30 cm³ of distilled water, labelled **G**.

8 cm³ of 6 % hydrogen peroxide solution, labelled **Q**.

A complete mature plant of *Bidens pilosa* (black jack) but not yet flowering, labelled **U**.

A complete mature plant of *Commelina benghalensis* (wandering jew) but not yet flowering, labelled **V**.

An onion bulb, labelled **W**.

An Irish potato tuber, labelled **Y**.

A light microscope, glass slides and cover slips.

2 droppers and razor blade/scarpel.

Dissecting kit, board, pins and cotton wool.

A thermometer and glass rod.

A plastic mug/beaker and labelling tape.

8 test tubes of the same make and size.

5 boiling tubes.

5 ml and 20 ml or 25 ml measuring cylinders.

5 petri dishes.

A thread (20 cm long).

A cork borer (5 mm diameter).

A mortar and a pestle.

A stop clock.

Access to:

Reagents for carrying out food tests.

Distilled water.

Source of heat.

Filter papers and printing paper.