Candidate's Name: .....

Signature: .....

Random No.					Personal No.		

(Do not write your School/Centre Name or Number anywhere on this booklet.)

P530/3
BIOLOGY
(Practical)
Paper 3
Nov. / Dec. 2022
3¼ hours

UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

BIOLOGY
(PRACTICAL)

Paper 3

3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

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

Answer **all** *the questions.*

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		

Turn Over

1. You are provided with specimen **Z**, which is freshly killed. Examine the external features using a hand lens where necessary.

(a) Giving reasons, state the order to which specimen **Z** belongs. *(05 marks)*

Order . .....

Reasons: .....

.....

.....

.....

.....

.....

(b) Measure the width of the widest region of the head, thorax, abdomen and then measure the width of the last abdominal segment of specimen **Z** in millimeters. Record your measurements in table **1**. State the significance of the measurements obtained in relation to the life of the specimen.

Table 1 *(04 marks)*

Part	Width (mm)	Significance of the measurements
Head		
Thorax		
Abdomen		
Last abdominal segment		

(c) (i) Detach one fore limb and one hind limb from specimen **Z**. Stretch them out and measure the length of each limb in millimeters. Record your measurements in table **2** and determine the ratio of the fore limb to hind limb.

Table 2 *(02 marks)*

Limb	Length (mm)	Ratio
Fore limb		
Hind limb		

(ii) Explain the significance of the ratio in table **2** to the life of the specimen **Z**. *(3½ marks)*

.....

.....

.....

.....

.....

.....

(d) Dissect specimen **Z** along the left lateral line to display the viscera in the abdomen of the specimen. Remove any pieces of odd fatty tissue present. Draw and label the structures displayed excluding the reproductive structures. *(14 marks)*

(e) Dissect further into the thorax to display the internal structures within the thorax on the ventral cuticle. Cut off the alimentary canal.

(i) Measure and record the length of the ventral cuticle.

..... mm *(01 mark)*

(ii) Draw and label all the internal structures that remain attached in the anterior half of the ventral cuticle. *(8½ marks)*

(iii) Explain the significance of the structures observed in (c) (ii) in the survival of specimen **Z**. *(03 marks)*

.....

.....

.....

.....

.....

2. You are provided with specimen **P**, solution **Q** and distilled water.

I. Using a cork borer provided, prepare six solid cylinders from specimen **P**, each with an initial length (IL) of 5 cm long.

II. Label six test tubes **A**, **B**, **C**, **D**, **E** and **F** and in each, pour a mixture of distilled water and solution **Q** in proportions shown in table **3**.

III. Place one cylinder obtained from specimen **P** in each of the test tubes, ensuring that it is immersed into the solution.

IV. Leave the test tubes to stand for **one** hour (*meanwhile you may continue with other work*).

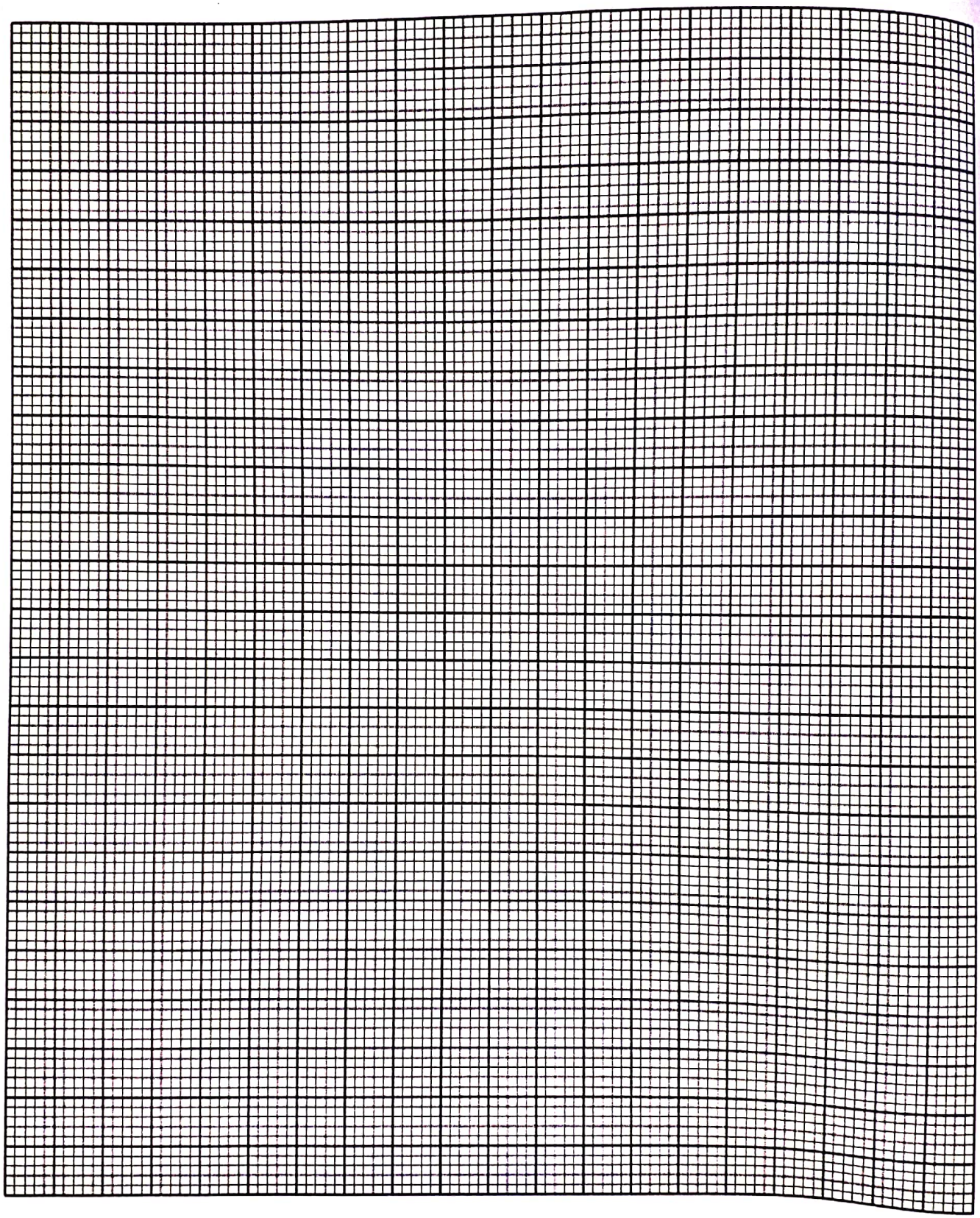
V. After one hour, remove each of the cylinders from the solutions, one at a time and place each on a filter paper. Quickly measure and record the new length (NL) of each cylinder in table **3** and complete the table.

(a) **Table 3** *(09 marks)*

Test tube	Volume of distilled water added (cm^3)	Volume of solution **Q** added (cm^3)	Length after one hour (NL) (cm)	Difference in length $\Delta L = NL - IL$ (cm)	Percentage of distilled water added
A	10	0			
B	8	2			
C	6	4			
D	4	6			
E	2	8			
F	0	10			

(b) (i) Plot a suitable graph to show the relationship between the difference in length with percentage of distilled water added.

(06 marks)



(ii) Using the graph, determine the percentage of solution **Q** by volume, with the same concentration as the cell sap of specimen **P**. Explain your answer. *(05 marks)*

.....

.....

.....

.....

.....

.....

(iii) Explain your graph in (b) (i). *(06 marks)*

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) (i) Explain why the new length of the cylinder in test tube **A** could not go beyond the length you have recorded in table **3**.
(1 hour is sufficient for the physiological process being investigated in this experiment.) *(05 marks)*

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Explain the ecological significance of the experimental results in the plant from which specimen **P** was obtained, if the soil solution is 37% water. *(04 marks)*

.....

.....

.....

.....

.....

.....

.....

.....

.....

3. You are provided with specimens; **H**, **I** and **J**.

(a) Using a hand lens, describe the

(i) arrangement of the florets of specimen **J**. *(02 marks)*

.....

.....

.....

.....

(ii) structure of the essential parts of a floret of specimen **I**. *(05 marks)*

.....

.....

.....

.....

.....

.....

.....

.....

(b) (i) Explain the significance of the arrangement of florets of specimen **J**. *(04 marks)*

.....

.....

.....

.....

.....

.....

.....

(ii) State the differences between the gynoecium of the florets of specimen **J** and specimen **I**. *(03 marks)*

.....

.....

.....

.....

.....

.....

(c) (i) Rub the anther of specimen **I** on the glass slide and observe the slide under medium power of a light microscope. Describe what you have observed. *(1½ marks)*

.....

.....

.....

(ii) From your observation in (c) (i), state the mode of pollination of the florets of specimen **I**. Give reasons for your answer. *(03 marks)*

.....

.....

.....

.....

.....

.....

(d) Using a sharp blade, cut off the peduncle of specimen **H**. Cut the remaining part longitudinally. Slice a thin section longitudinally along the same plane from one half. Observe the slice under low power of a light microscope. Draw and label. *(5½ marks)*

END