

P530/3
BIOLOGY
Paper 3
June 2023
3¼ hours

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Release: ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑳
Version: School ☒ National ☒ Seminar ☒ Textbook ☒

UACE BIOLOGY PRACTICAL

Paper 3

3 hours 15 minutes

INSTRUCTIONS:

*Answer **all** questions in this paper.
Write answers using **black or blue ink**.
Make your **drawings** using **HB pencil**.*

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

For Examiners' Use Only	
Questions	Marks
1	
2	
3	
Total	

1. Examine the external anatomy of specimen **Z**, carefully.

a) How do locomotor structures of specimen **Z** enable it adapt to the natural environment?

(03 marks)

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Turn specimen **Z** ventral surface up and locate the mouth. Pry open the lower jaw and cut the jaw bone at the corners of the mouth on either side, so that it remains open. Locate and identify the visible structures in the mouth of specimen **Z**.

b) (i) How is the position of the vomerine teeth significant?

(02 marks)

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ii) Describe the appearance of the tongue and explain its significance.

(02 marks)

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c) Draw and label the mouth with all visible structures within.

(10 marks)

Dissect specimen **Z** to open the abdominal cavity. Locate the vertebral column and carefully cut away connective tissues surrounding it. Displace internal organs leftward of the specimen, to display spinal nerves, which appear as white cords on each side of the vertebral column. Gently locate the sympathetic nerves that consist of a cord on each side closely following the course of the systemic arches and the dorsal aorta. Use a hand lens to observe the position and arrangement of spinal and sympathetic nerves.

d) Draw and label the nerves and structures of vertebral column displayed in ventral view.

(20 marks)

2. You are to investigate some of the factors that affect enzyme reactions.

I. Soak fully, 15 filter paper discs into 20 ml of solution Y in the beaker.

II. Dilute solution X as described below, in separately labeled test tubes.

- 0.0% solution X: 10.0 ml distilled water.
- 0.38% solution X: 1.25 ml solution X + 8.75 ml distilled water.
- 0.75% solution X: 2.5 ml solution X + 7.5 ml distilled water.
- 1.5% solution X: 5.0 ml solution X + 5.0 ml distilled water.
- 3.0% solution X: 10.0 ml solution X.

III. Measure to the nearest 1 mm and record the depth of solution X in each test tube.

IV. Use a **clean** pair of forceps to remove one paper disc from solution Y in the beaker.

V. Brush both sides of the disc against the rim of the beaker to remove solution Y.

VI. Swiftly lower the disc into the bottom of the first test tube and start the timer as soon as the disc reaches the bottom of test tube.

VII. Record the time it takes the filter paper disc to rise to the top in the first 180 seconds.

VIII. Gently swirl each of the remaining test tubes to mix the contents and repeat the procedure (steps III-VII) using solution X of different concentration.

NOTE: Find the average rise time in each test tube by using 2 discs, one after another.

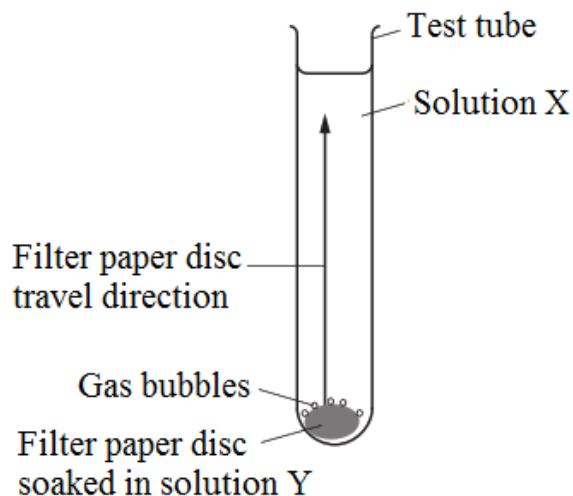


Table 1: Results of the experiment.

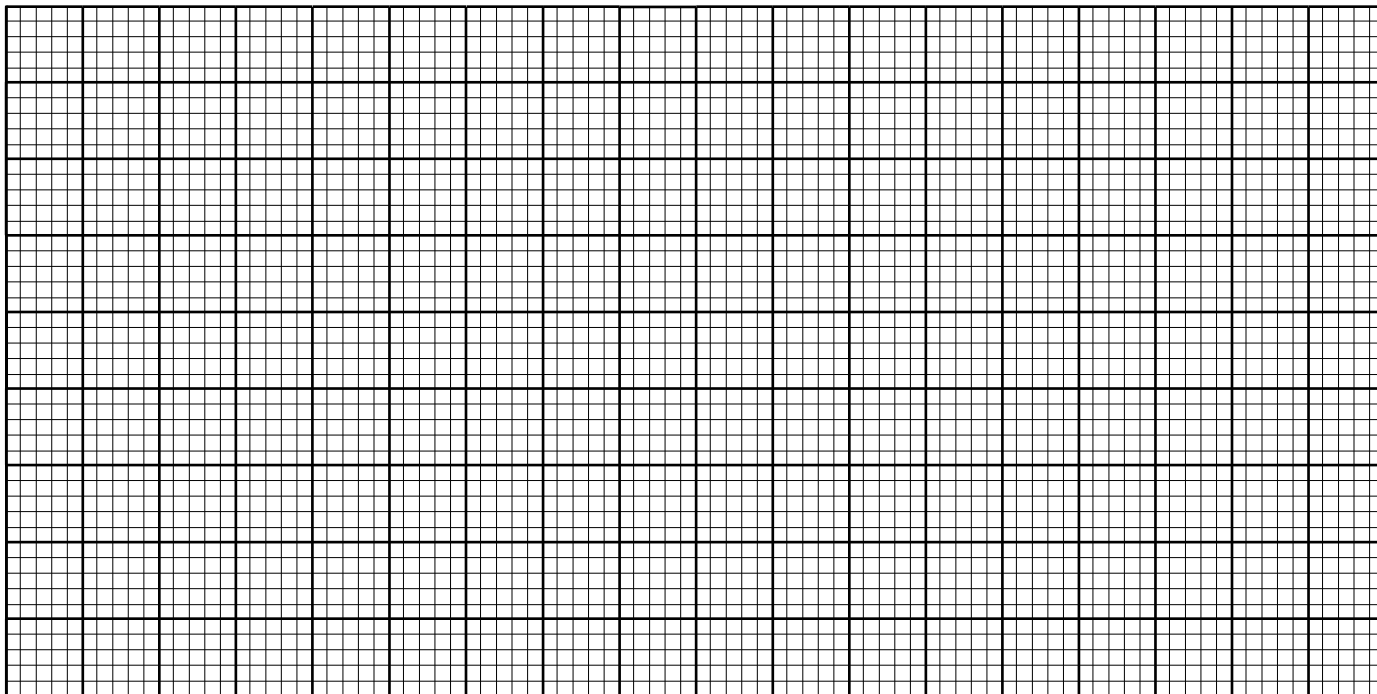
Solution X concentration (%)	Solution X depth (mm)	Average disc rise time (sec)	Rate = $\frac{\text{Solution depth}}{\text{Rise time}}$ (mm sec^{-1})
0.0			
0.38			
0.75			
1.5			
3.0			

a) Work out the required information and complete table 1.

(10 marks)

b) Plot a graph using data for solution X concentration and reaction rate.

(09 marks)



c) Describe the effect of varying concentration of solution X on reaction rate.

(05 marks)

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d) Explain your observations in terms of the enzyme's reaction rate.

(08 marks)

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e) Suggest other factors that would affect this investigation, and explain the possible effects on the results. (04 marks)

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3. Examine specimens **R₁**, **R₂**, **S** and **T** carefully, using a hand lens where necessary.

a) Describe the reproductive structures of each specimen. (09 marks)

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b) Explain how each specimen is adapted for reproduction. (06 marks)

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c) With respect to ecological survival, what are the advantages of?

i) Specimen **R₁** over Specimen **S**. (02 marks)

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ii) Specimen **S** over Specimen **R₁**.

(02 marks)

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d) From the ecological perspective, explain how specimen **R₁**, **S** and **T** benefit humans.

(03 marks)

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e) Draw specimen **T** to show reproductive structures.

(05 marks)

END.

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