

**PAPER III
BIOLOGY**

Question 1

- a. You will investigate the effect of temperature on enzyme action.
Use materials provided in the **Table 1.1**

Table 1.1

Specimen	Apparatus	Chemical
Potato tuber	Test tube (3 No), test tube rack (1 No), cork (3 No), beaker (3 No), dropper (1 No), water bath (1 No), thermometer (1 No), ruler (1 No) and ice	Hydrogen peroxide (H ₂ O ₂)

If hydrogen peroxide comes in contact with your skin, wash off immediately under water.

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- i. Carry out step 1 to step 5.

- Step 1 Peel off the potato skin and cut it into small cubes of equal volume (1 cm³).
- Step 2 Place a potato cube each into three test tubes and label them as A, B, and C.
- Step 3 Maintain the temperature of test tube A, B and C at 00C, 370C and 600C respectively for 10 min.
- Step 4 Add 5 mL of H₂O₂ in each test tube and cover the mouth of all the test tubes with cork stopper. Observe the set-up after 2 minutes (**show to Visiting Examiner**).
- Step 5 Measure the height of the froth column formed and record in the Observation **Table 1.2**.

[2]

Table 1.2

Temperature (°C)	Height of the froth column (cm)
0°C	
37°C	
60°C	

[2]

- ii. Plot a graph that illustrates the height of froth column against temperature on the grid in the **Figure 1.1**. Use a sharp pencil.

[4]

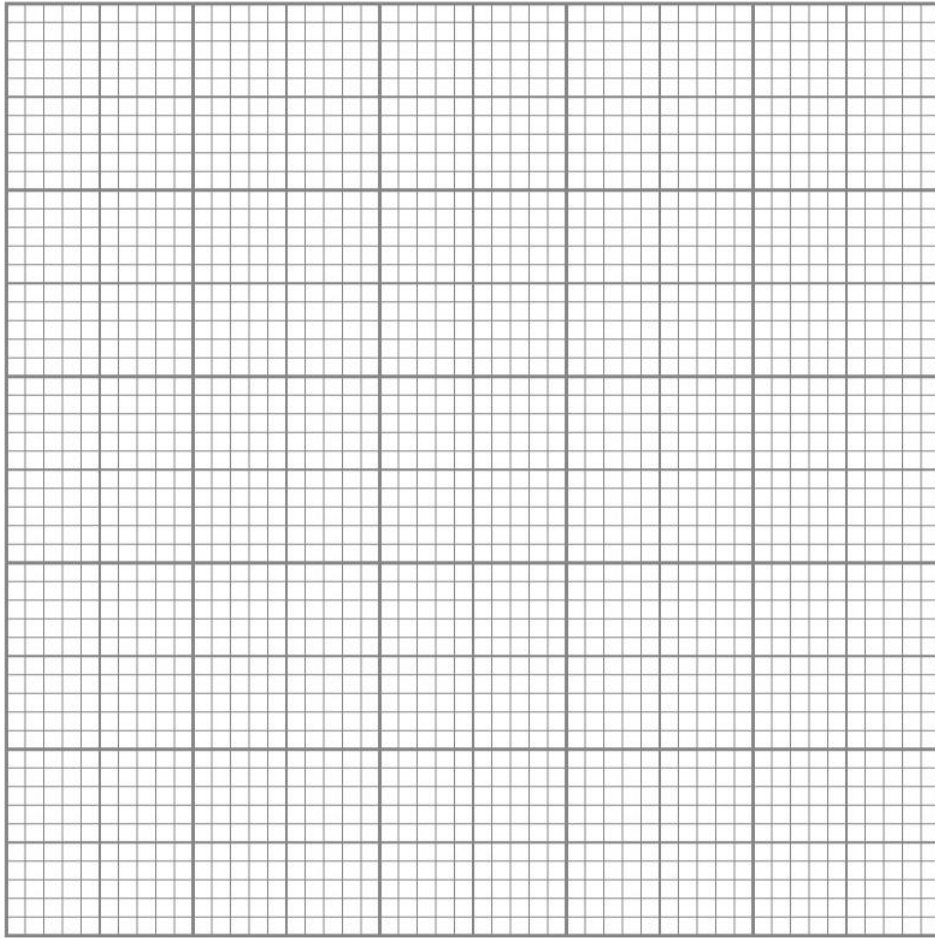


Figure 1.1

- iii. Use graph to describe how temperature affects enzyme action.

[1]

- iv. Identify **one** variable that must be kept constant to ensure a fair test.

[1]

- v. Suggest **two** improvements to increase the reliability and accuracy of the results.

[2]

- vi. Propose a suitable control experiment for this investigation. [1]

Question 2

- a. You will be given three minutes to examine each of the **specimens: A and B**. Take back your answer script to your working table and complete the rest of the work.
- i. Identify and write down one key identification features of **specimen A and B** in the **Table 2.1**. [4]

Table 2.1

Specimen	Name	Features
A		
B		

- ii. Sketch a diagram of the **Specimen-A** and label **one** identifying structure. [2]

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- b. You will prepare a temporary mount of the **Specimen S1** using materials provided in **Table 2.2** and study its anatomical structure.

Carry out step 1 to 5.

- Step 1 Prepare a transverse section (TS) of the **Specimen S1** using a sharp razor blade.
- Step 2 Place the sections in a watch glass containing safranin stain and leave for **1–2 minutes**.
- Step 3 Select one stained section and place on the centre of the clean glass slide.
- Step 4 Add a drop of glycerine on the section and carefully lower a coverslip at an angle using a needle to avoid trapping air bubbles.
- Step 5 Observe the slide under a low-power objective lens.

- i. Show how a low-power objective lens view of the **Specimen S1** to the **Visiting Examiner**. [4]

- ii. Identify **Specimen S1**. State **one** key feature used to identify the specimen. [2]

- iii. Sketch the vascular bundle enclosed by the bundle sheath as observed under low power. Label xylem vessel.

[2]

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- iv. Identify **one** source of error during staining and propose an appropriate corrective measure.

[2]

- v. State **one** reason each for the need to stain and mount the section to be observed under a microscope.

[2]

- vi. Outline the procedure for placing a coverslip onto a wet mount to avoid trapping air bubbles.

[3]

- vii. Figure 2.1 shows the observation of specimen under light microscope.

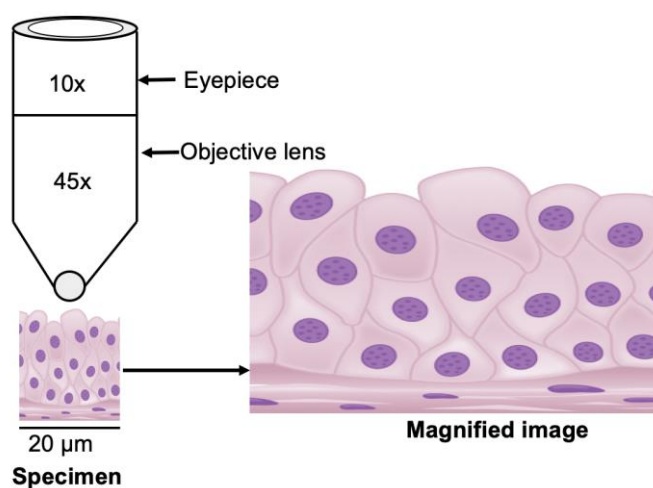


Figure 2.1

Calculate the size of magnified image of the specimen shown in **Figure 2.1**.

[2]

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- viii. Figure 2.1 is the transverse section of the leaf with the microscope graticule.
1 division in the graticule represents 2.5 mm

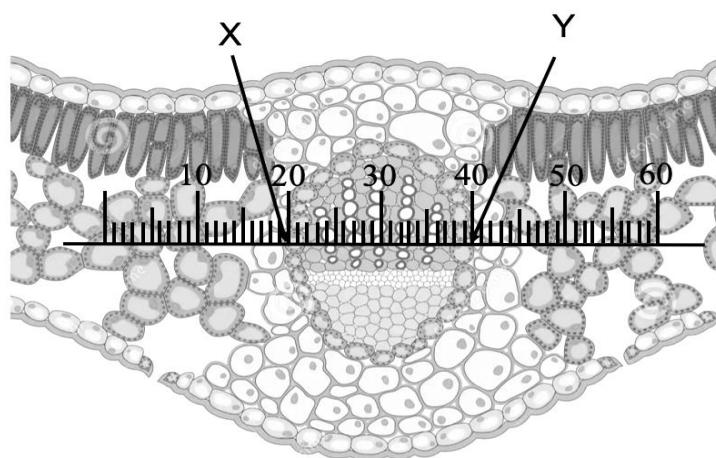


Figure 2.1

Count the divisions in the graticule between X and Y.

Calculate the magnified diameter of the vascular bundle using the total divisions in the graticule between X and Y in micrometers (μm). Show your working

Use 1 mm = 1000 μm

[4]

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