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Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

4101582432

BIOLOGY **9700/35**

Paper 3 Advanced Practical Skills 1 **May/June 2024**

2 hours

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

For Examiner's Use	
1	
2	
Total	

This document has **12** pages. Any blank pages are indicated.

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[Turn over

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1 Beetroot is a root vegetable that contains a red pigment in its cells. When beetroot is put in ethanol, the red pigment is released from the beetroot tissue and the ethanol changes to a red colour.

You will investigate the effect of different concentrations of ethanol on the release of red pigment from beetroot tissue.

You are provided with the materials shown in Table 1.1.

Table 1.1

labelled	contents	hazard	volume / cm^3
B	4 beetroot cylinders in distilled water	none	-
E	50% ethanol	flammable harmful	100
W	distilled water	none	300

If any solution comes into contact with your skin, wash off immediately under cold water.

You should wear suitable eye protection.

You will need to make different concentrations of ethanol, using proportional dilution of the 50% ethanol, **E**.

You will need to prepare 20 cm^3 of each concentration, using **E** and **W**.

Table 1.2 shows how to prepare two of the concentrations of ethanol you will use.

Decide which other concentrations of ethanol you will use.

(a) (i) Complete Table 1.2 for the other concentrations you will use.

Table 1.2

percentage concentration of ethanol	volume of E / cm^3	volume of W / cm^3
50	20.0	0.0
0	0.0	20.0

[2]

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Carry out step 1 to step 14.

step 1 In the beakers provided, prepare the concentrations of ethanol as shown in Table 1.2.

step 2 Label large test-tubes with the concentrations of ethanol stated in Table 1.2.

step 3 Put 10 cm^3 of each concentration of ethanol into the appropriately labelled large test-tubes.

step 4 Cut the beetroot cylinders into 2 mm thick discs, using a single-edged blade.
You will need 10 discs for each concentration of ethanol.

step 5 Put the discs into a small beaker and cover with distilled water, **W**.

step 6 Stir with a glass rod.

step 7 Pour the surrounding liquid into the beaker labelled **For waste**.

step 8 Blot the discs on a paper towel to remove excess water.

step 9 Put 10 discs into each of the large test-tubes. Start timing and leave for 10 minutes.

While you are waiting use your time to continue with other parts of Question 1.

step 10 Label small test-tubes with the ethanol concentrations shown in Table 1.2.

step 11 After 10 minutes (at the end of step 9) stir the contents of each large test-tube.

step 12 Pour the liquid from each large test-tube into the appropriately labelled small test-tube.
The discs should remain in the large test-tubes.

Fig. 1.1 shows the key you need to use to record your results.

Key

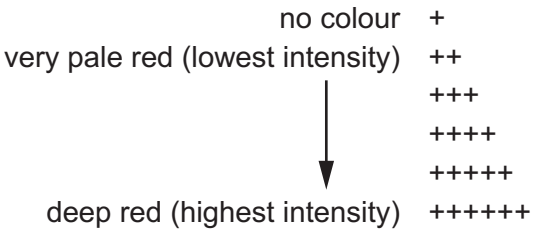


Fig. 1.1

step 13 Observe the colour of the liquid in each small test-tube.

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step 14 Record your observations in **(a)(ii)** using the symbols shown in the key in Fig. 1.1.

(ii) Record your observations in an appropriate table.

[5]

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(iii) Describe the trend in your results.

.....

.....

..... [1]

(iv) With reference to your results in **(a)(ii)**, explain the effect of ethanol on cell membranes.

.....

.....

.....

.....

.....

..... [3]

(v) State the dependent variable in this investigation.

..... [1]

(vi) State **one** variable that was standardised **and** describe how it was standardised.

.....

.....

..... [1]

(vii) Identify **one** source of error in this investigation.

.....

.....

..... [1]

(viii) Describe how you would modify the procedure to investigate the effect of temperature on the permeability of beetroot cell membranes.

.....

.....

.....

.....

..... [2]

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(b) Researchers investigated the effect of drinking beetroot juice on blood pressure.

Two groups of people were used in the investigation.

- One group was given 500 cm^3 of beetroot juice to drink.
- A control group was given 500 cm^3 of water to drink.
- The mean blood pressure of each group was measured at intervals.
- The difference in mean blood pressure between the two groups was calculated.

Table 1.3 shows the results of the investigation.

Table 1.3

time after drinking / minutes	**difference in mean blood pressure compared to control group / kPa**
0	0.0
25	–0.28
80	–0.57
125	–0.92
160	–1.33
220	–0.87

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(i) Plot a graph of the data shown in Table 1.3 on the grid in Fig. 1.2.

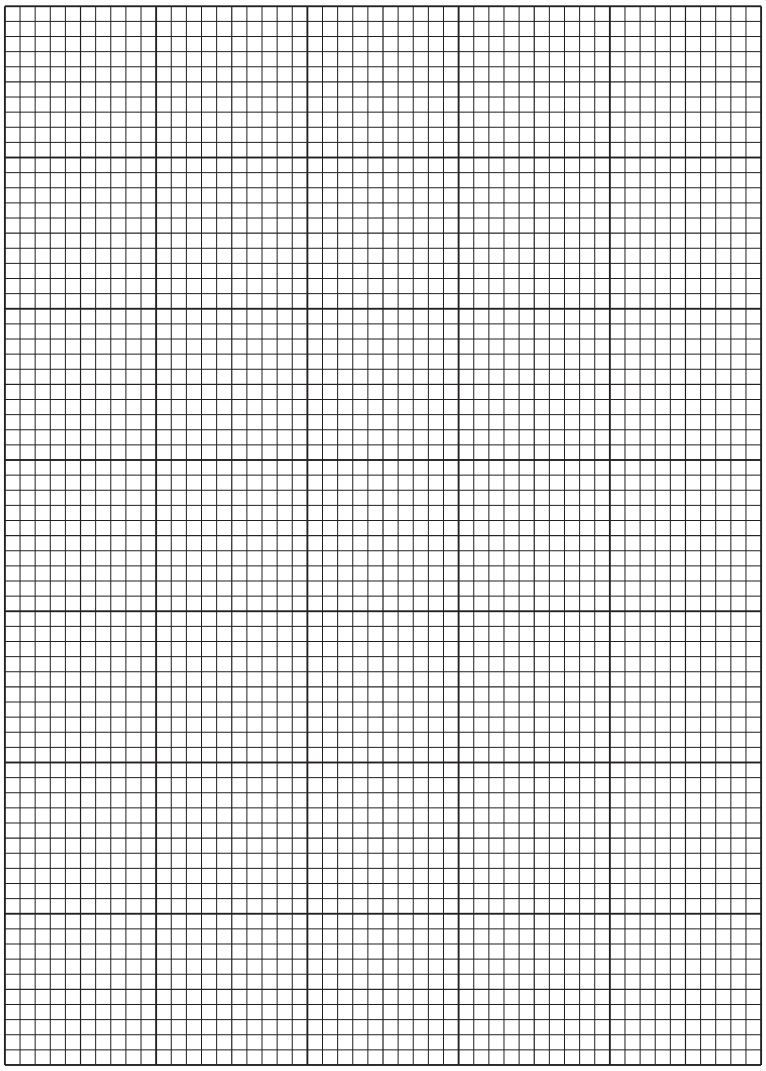


Fig. 1.2

[4]

(ii) After 100 minutes, the mean blood pressure for the control group was 15.79 kPa.

Use your graph in Fig. 1.2 to calculate the mean blood pressure after 100 minutes for the group that was given beetroot juice.

Show your working.

mean blood pressure after 100 minutes = ... kPa [2]

[Total: 22]

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2 **N1** is a slide of a stained transverse section through a plant leaf.

(a) **(i)** Draw a large plan diagram of part of the leaf section on **N1** to show the different tissues.

The section that you choose to draw should include **four** vascular bundles.

Use **one** ruled label line and label to identify **one** vascular bundle.

[5]

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(ii) Observe the cells in the epidermis of the leaf on **N1**.

Select **two** guard cells **and two** adjacent epidermal cells.
Each cell must touch at least **one** other cell.

- Make a large drawing of this line of **four** cells.
- Use **one** ruled label line and label to identify the cell wall of **one** guard cell.

[5]

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(b) Fig. 2.1 is a photomicrograph of a transverse section of a leaf from a different type of plant.

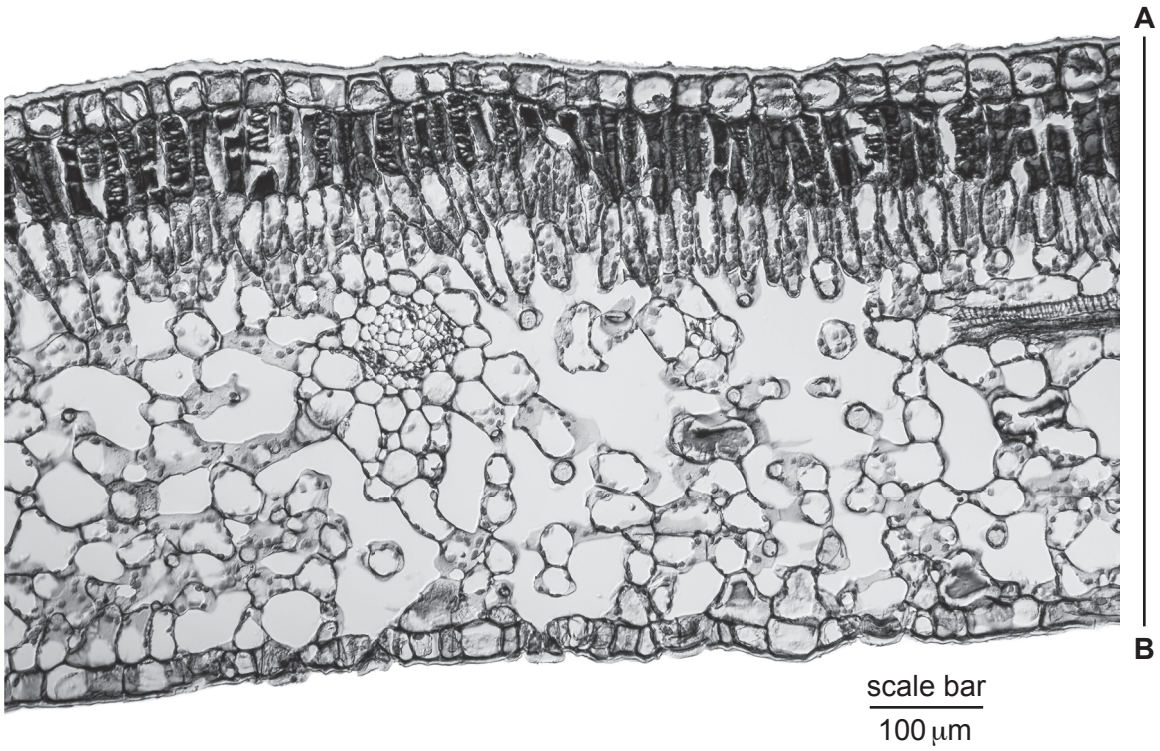


Fig. 2.1

(i) Identify **three** observable features, other than colour, that are different between the leaf section on **N1** and the leaf section in Fig. 2.1.

Record these **three** observable features in an appropriate table.

[4]

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(ii) Line **A**–**B** represents the thickness of the leaf in Fig. 2.1.

Use the scale bar in Fig. 2.1 to calculate the actual thickness of the leaf.

Show your working.

Include the unit in your answer.

actual thickness = ... [3]

(iii) Use your value from **(b)(ii)** to calculate the magnification of Fig. 2.1.

Give your answer to **two** significant figures.

magnification = × ..... [1]

[Total: 18]

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