Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3039668624

BIOLOGY **9700/35**

Paper 3 Advanced Practical Skills 1 **May/June 2021**

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 **16** pages. Any blank pages are indicated.

Before you proceed, read carefully through the **whole** of Question 1 and Question 2.

Plan the use of the **two hours** to make sure that you finish the whole of Question 1 and Question 2.

1 A farmer who grows grapes needs to pick them when they have the highest reducing sugar content.

You will be using the Benedict's test to determine the concentration of reducing sugars in different samples of grape juice, **U1**, **U2** and **U3**.

You are provided with the materials shown in Table 1.1.

Table 1.1

labelled	contents	hazard	volume / cm^3
U1	unknown concentration of reducing sugars	none	20
U2	unknown concentration of reducing sugars	none	20
U3	unknown concentration of reducing sugars	none	20
W	distilled water	none	100
B	Benedict's solution	harmful irritant	50
R	2% reducing sugar solution	none	50

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

It is recommended that you wear suitable eye protection.

(a) The Benedict's test requires you to heat test-tubes containing some of the above solutions in a boiling water-bath.

Read step 1 to step 5 on page 3 and then assess the risk of using a boiling water-bath in these steps as **low**, **medium** or **high**.

State the level of risk. .....

(i) State **one** reason for your answer.

.....

..... [1]

Carry out step 1 to step 9.

1. Set up a water-bath and heat to boiling ready for step 5, step 15 and step 22.

2. Label 3 test-tubes **U1**, **U2** and **U3**.

3. Put 2 cm^3 of **U1** in the test-tube labelled **U1**.

4. Put 2 cm^3 of **B** into the test-tube containing **U1**. Shake gently to mix.

5. Put this test-tube into the boiling water-bath. Start timing.

6. Measure the time taken for the first appearance of a colour change in the test-tube.
   If there is no colour change after 120 seconds, stop timing.

7. Record the result in **(a)(ii)**. If there is no colour change after 120 seconds, record as 'more than 120'.

8. Remove the test-tube from the water-bath and put it in the test-tube rack.

9. Repeat step 3 to step 8 for **U2** and **U3**.

(ii) Record your results for **U1**, **U2** and **U3** in an appropriate table.

[3]

(iii) Using your results in **(a)(ii)**, state which sample, **U1**, **U2** or **U3**, has the highest concentration of reducing sugars.

..... [1]

You will need to carry out a **serial** dilution of the 2% reducing sugar solution, **R**, to reduce the concentration by **half** between each successive dilution.

Fig. 1.1 shows the first 2 beakers you will use to make your serial dilution.

(iv) Complete Fig. 1.1 by drawing as many extra beakers as you need for your serial dilution of reducing sugar solution.

For each beaker add labelled arrows to show:

- The volume of reducing sugar solution transferred
- The volume of water added.

Under each beaker, state the concentration of reducing sugar solution.

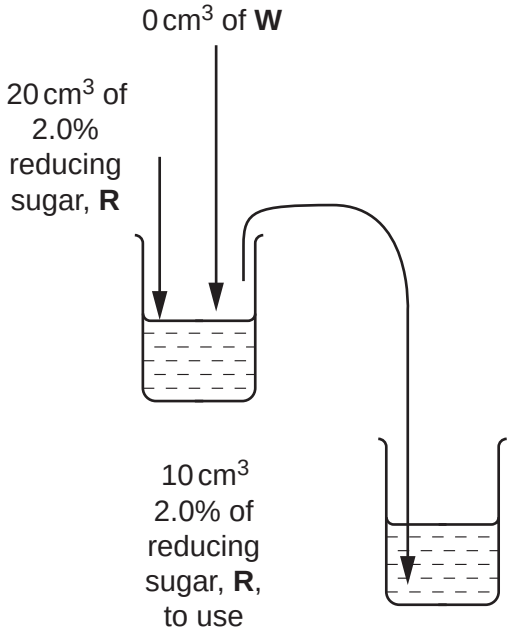
0 cm3 of W
20 cm3 of 2.0% reducing sugar, R
10 cm3 2.0% of reducing sugar, R, to use

Fig. 1.1

[3]

Carry out step 10 to step 19.

10. Prepare the concentrations of reducing sugar solution as shown in Fig. 1.1.

11. Label test-tubes with the concentrations you prepared in step 10.

12. Put 2 cm^3 of 2% reducing sugar solution into the appropriately labelled test-tube.

13. Put 2 cm^3 of **B** into the same test-tube. Shake gently to mix.

14. Repeat step 12 to step 13 with the other concentrations you prepared in step 10.

15. Put all the test-tubes into the boiling water-bath. Start timing.

16. Leave the test-tubes in the boiling water-bath for 1 minute.

17. Remove the test-tubes with a test-tube holder and put them into a test-tube rack.

18. Observe the colour in each test-tube. You may see the same colour in more than one test-tube.

19. Record the colours in **(a)(v)** using the words:

red **orange** **brown** **green** **blue**

(v) Record your results in an appropriate table.

[4]

In **(a)(iii)** you identified the solution with the highest concentration of reducing sugars as either **U1**, **U2** or **U3**.

20. Put 2 cm^3 of the solution you identified in **(a)(iii)** into a test-tube.

21. Put 2 cm^3 of **B** into the same test-tube. Shake gently to mix.

22. Put the test-tube into the boiling water-bath. Start timing.

23. Leave the test-tube in the boiling water-bath for 1 minute.

24. Remove the test-tube with a test-tube holder and put it into a test-tube rack.

25. Observe the colour in the test-tube. Record the colour in **(a)(vi)**, using one of the words:

red **orange** **brown** **green** **blue**

(vi) State the colour observed in step 25 .....

Using your results in **(a)(v)**, estimate the concentration of reducing sugars in this sample.

..... [1]

A student carries out the same procedure and finds that one of the unknown samples gives a negative result for reducing sugars. The student thinks that the sample may contain non-reducing sugars.

(vii) Describe how you would modify the procedure to test for non-reducing sugars.

.....

.....

.....

.....

.....

.....

.....

..... [3]

(b) As grapes ripen, the concentrations of the different reducing sugars change.
A scientist measured the concentration of glucose and fructose at different stages of ripening.

The results are shown in Table 1.2.

Table 1.2

stage of ripening	percentage concentration of reducing sugar	
	glucose	fructose
unripe	9	1
ripening	7.5	9.5
ripe	3	22

Draw a bar chart of the data in Table 1.2 on the grid in Fig. 1.2.

Use a sharp pencil for drawing bar charts.

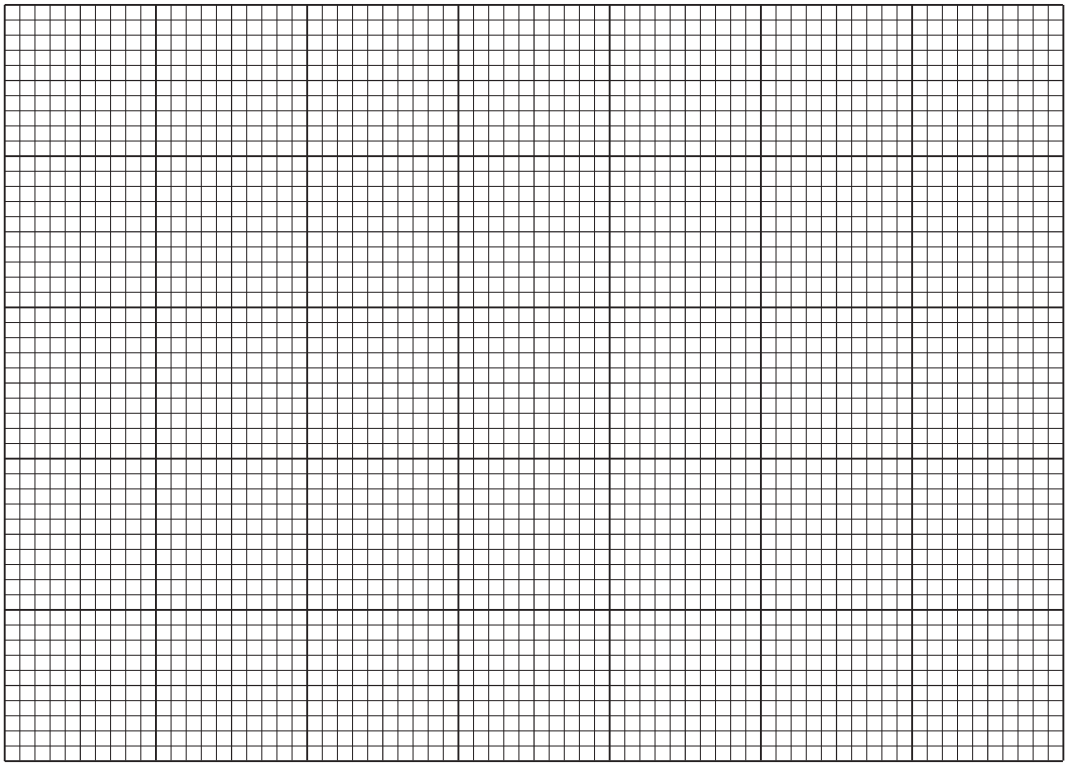

Fig. 1.2

[4]

[Total: 20]

Question 2 starts on page 10.

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

(a) Set up the microscope so that you can observe the section on **N1**.

Observe the different tissues in the area on **N1** shown by the shaded region in Fig. 2.1.

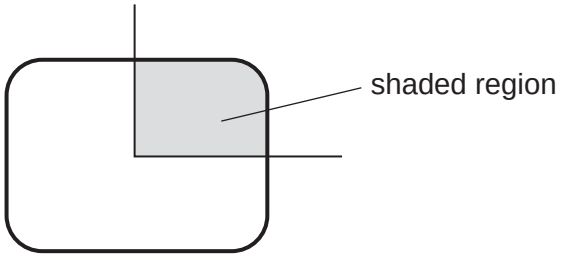

Fig. 2.1

Use a sharp pencil for drawing.

(i) Draw a large plan diagram of the area of the section on **N1** as shown by the shaded region in Fig. 2.1. Your drawing should show the correct shapes and proportions of the different tissues.

Use **one** ruled label line and label to identify xylem tissue.

[5]

(ii) Observe the cells in the central tissue of the section on **N1**.

Select **four** adjacent, touching cells of the central tissue. Each cell must touch at least two of the other cells.

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

[5]

(b) Fig. 2.2 is a photomicrograph of a stained transverse section of a different type of plant.

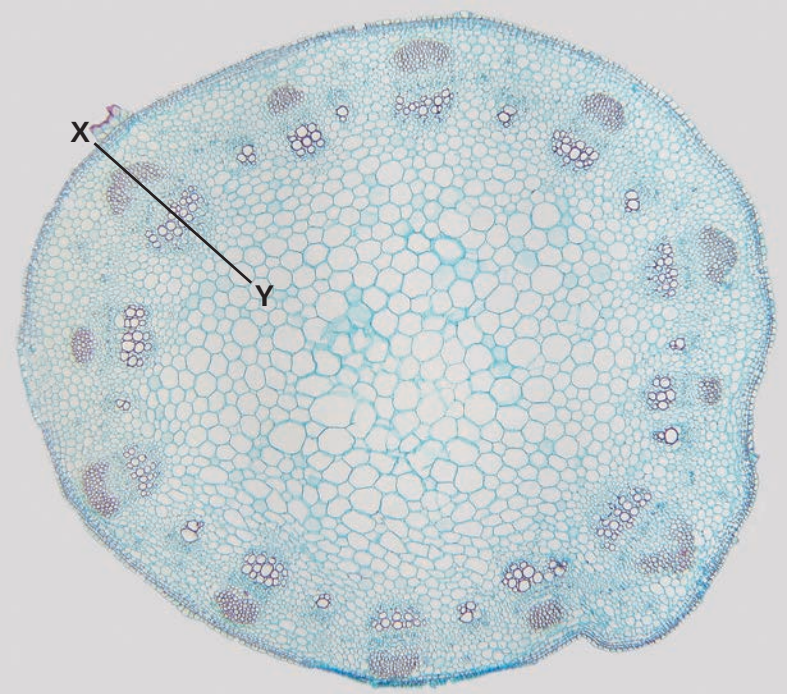

Fig. 2.2

(i) Use the scale bar and line **X**–**Y** on Fig. 2.2 to calculate the actual length of the vascular bundle.

Show your working and use appropriate units.

..... [3]

(ii) Identify the organ shown in Fig. 2.2.

.....

Give reasons for your answer.

.....

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.....

.....

..... [3]

(iii) Identify the observable differences between the section on **N1** and Fig. 2.2.

Record the observable differences in Table 2.1.

Table 2.1

feature	N1	Fig. 2.2

[4]

[Total: 20]

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