Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

3864530823

BIOLOGY **9700/33**

Paper 3 Advanced Practical Skills 1 **May/June 2020**

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. 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 Energy drinks contain a high concentration of carbohydrates, such as glucose, as a source of energy.

Glucose is a monosaccharide which can be quickly metabolised by body cells, releasing energy during exercise.

Glucose changes the colour of potassium manganate(VII) solution, **P**, from purple to colourless. The end-point is when **P** is completely colourless.

You will need to:
- prepare different concentrations of glucose solution
- record the time taken to reach the end-point for the known glucose concentrations
- use your results to estimate the concentration of glucose in an energy drink, **U**.

You are provided with the materials shown in Table 1.1.

Table 1.1

labelled	contents	risk	volume / cm^3
G	20% glucose solution	none	50
W	distilled water	none	20
A	dilute sulfuric acid	irritant	20
P	potassium manganate(VII) solution	low risk irritant	20
U	energy drink	none	10

It is recommended that you wear suitable eye protection.

If **A** or **P** come into contact with your skin, wash off immediately under cold water.

(a) You will need to prepare different concentrations of glucose solution.

The lowest concentration you will prepare is 12%.

You will need to prepare $10\,cm^3$ of each concentration, using **G** and **W**.

Table 1.2 shows how to make up two of the concentrations of glucose solution you will use.

Decide which other concentrations of glucose solution you will use.

(i) Complete Table 1.2 to show how you will prepare the concentrations of glucose you will use.

Table 1.2

percentage concentration of glucose	volume of **G** / cm^3	volume of **W** / cm^3
20	10	0
12	6	4

[2]

Carry out step 1 to step 8.

1. Prepare the concentrations of glucose solution, as shown in Table 1.2, in the beakers provided.

2. Label test-tubes with the concentrations of glucose prepared in step 1.

3. Put 1 cm^3 of 20% glucose solution into the appropriately labelled test-tube.

4. Repeat step 3 with each of the other concentrations of glucose.

5. Put 1 cm^3 of **A** into each of the test-tubes. Shake gently to mix.

   The reaction will start as soon as you put **P** into the test-tubes (step 6).

   Do **not** stop the timer – keep it running continuously.

6. Put 1 cm^3 of **P** into each of the test-tubes and start timing. Shake gently to mix.

7. Measure the time taken for each test-tube to reach the end-point. As each end-point is reached, record the time taken in the space provided for raw results. Do **not** stop the timer.

8. Record in **(a)(ii)** the time taken for each test-tube to reach the end-point.

   If the end-point has not been reached after 600 seconds (10 minutes) record the time as ‘more than 600’.

Use this space for raw results.

(ii) Record your results in an appropriate table.

[5]

9. Label a test-tube **U** and put 1 cm^3 of **U** into this test-tube.

10. Repeat step 5 to step 7 using the test-tube labelled **U**.

(iii) Record the time taken to reach the end-point for **U**.

time for **U** = ... s [1]

(iv) Estimate the percentage concentration of glucose in **U**.

concentration in **U** = ... % [1]

(v) Describe how you would modify this procedure to give a more accurate estimate of **U**.

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.... [3]

(vi) State **two** significant sources of error when carrying out step 7.

....

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.... [2]

(vii) Describe how you would modify this procedure to reduce **one** source of error as stated in **(a)(vi)**.

....

....

.... [1]

(b) An investigation was carried out into the effect of drinking an energy drink on blood glucose concentration over a period of 3 hours.

The results are shown in Table 1.3.

Table 1.3

time / hours	**glucose concentration / mmol dm^{-3}**
0.0	5.2
0.5	7.5
1.0	9.1
2.0	8.4
3.0	7.9

Plot a graph of the data in Table 1.3 on the grid in Fig. 1.1.

Use a sharp pencil for drawing graphs.

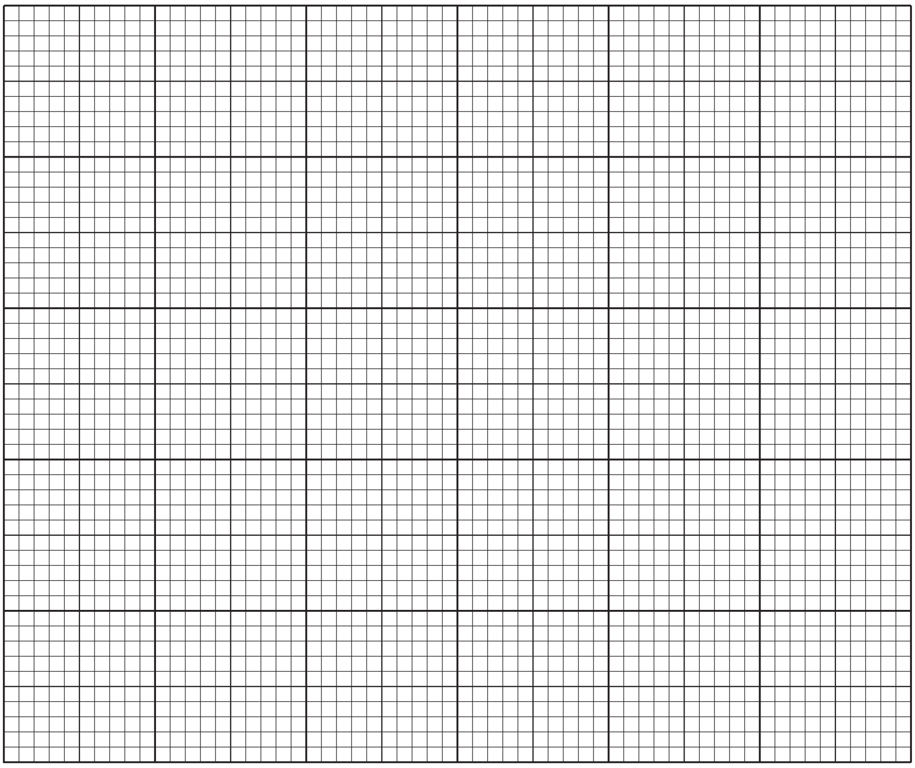

Fig. 1.1

[4]

[Total: 19]

2 **K1** is a slide of a stained transverse section through a plant root.

You are not expected to be familiar with this specimen.

Use a sharp pencil for drawing.

You are expected to draw the correct shape and proportions of the different tissues.

(a) **(i)** Draw a large plan diagram of the whole root.

Use **one** ruled label line and label to identify the endodermis.

[5]

(ii) Observe the xylem vessel elements in the centre of the root on **K1**.

Select **one** large xylem vessel element and **three** adjacent, touching, smaller cells.

Each smaller cell must touch the xylem vessel element and at least **one** of the other smaller cells.

Make a large drawing of this group of **four** cells.

Use **one** ruled label line and label to identify a cell wall of **one** cell.

[5]

(b) Fig. 2.1 is a photomicrograph of a stained transverse section through a root of a differe... plant species. You are not expected to be familiar with this specimen.

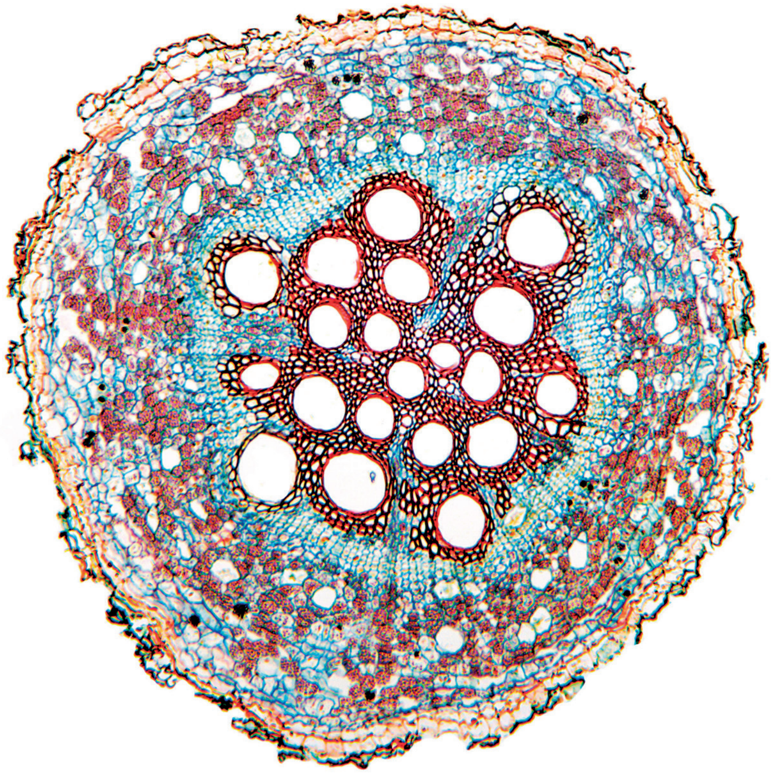

Fig. 2.1

Prepare an appropriate table so that it is suitable for you to record the observable differences between the root on **K1** and the root in **Fig. 2.1**.

Record the observable differences in your table.

[4]

(c) Fig. 2.2 is a photomicrograph of the same root section as in Fig. 2.1, with the central area enlarged.

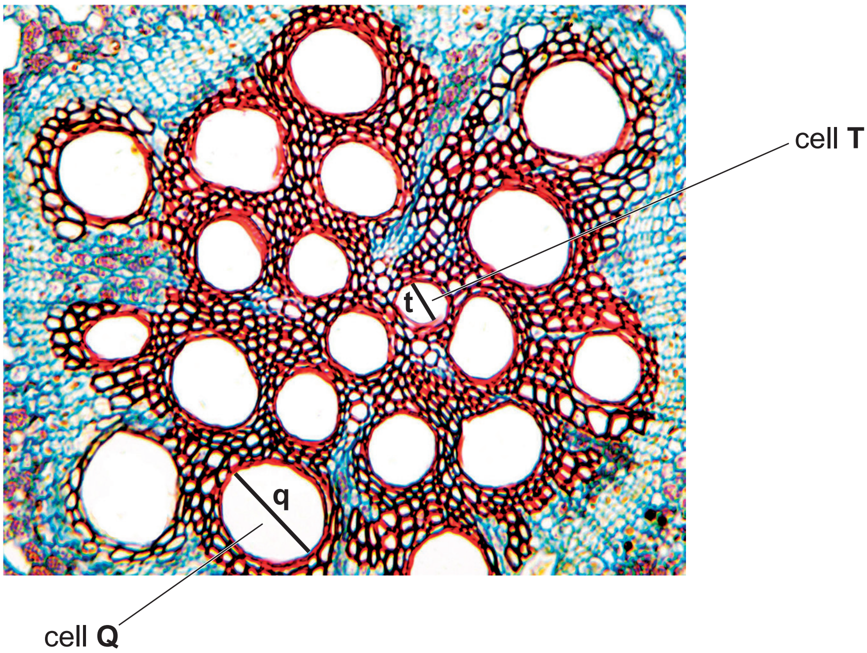

Fig. 2.2

(i) Measure line **q** and line **t** to find the diameter of cell **Q** and cell **T** as shown in Fig. 2.2.

diameter of cell **Q** = ...

diameter of cell **T** = ... [2]

(ii) Calculate the percentage difference in diameter between cell **Q** and cell **T**.

Show all the steps in your working.

percentage difference = ... % [3]

(iii) Using your knowledge of adhesion and cohesion, suggest why the difference in diameter of cell **Q** and cell **T** may affect the movement of water in xylem.

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.... [2]

[Total: 21]