Cambridge International AS & A Level

**Cambridge International Examinations**
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

*8517027387*

**BIOLOGY** **9700/33**

Paper 3 Advanced Practical Skills 1 **May/June 2017**

**2 hours**

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do **not** use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

| For Examiner's Use | |
|---|---|
| 1 | |
| 2 | |
| Total | |

This document consists of **10** printed pages and **2** blank pages.


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CAMBRIDGE International Examinations

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 all the work that you would like to do.

If you have enough time, think about how you can improve the accuracy of your results, for example by obtaining and recording one or more additional measurements.

You will **gain marks** for recording your results according to the instructions.

**1** When a person eats food containing starch, the enzyme amylase is released to hydrolyse (break down) the starch into reducing sugar.

As the food passes from the mouth to the stomach and then to the small intestine, amylase is released in the mouth and in the small intestine but is not released in the stomach.

**(a)** Fig. 1.1 shows a sketch of the changes in the concentration of the biological molecule, starch, as it enters the mouth and passes to the small intestine.

Sketch **another** line on the graph to show the changes in the concentration of **reducing sugar** as the starch enters the mouth and passes to the small intestine.

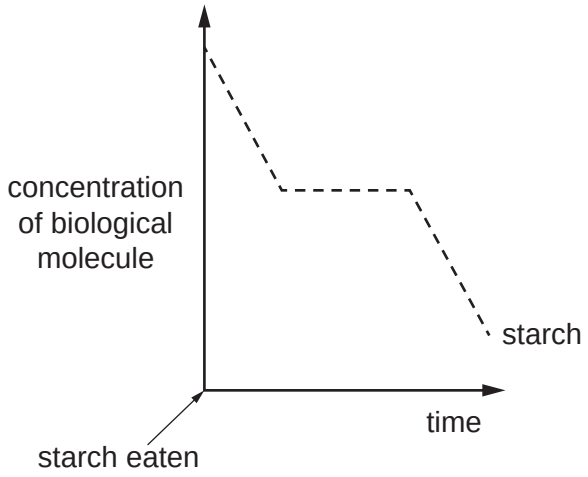



**Fig. 1.1** [2]

**(b)** You are provided with four samples, **S1**, **S2**, **S3** and **S4**.

One of these samples contains starch suspension which a person is about to eat.

The other three represent samples taken from:

- the mouth 2 minutes after being eaten
- the stomach 10 minutes after being eaten
- the small intestine 2 hours (120 minutes) after being eaten.

You are required to identify the samples **S1**, **S2**, **S3** and **S4** by testing the samples for starch and for reducing sugar, using only the apparatus and reagents provided.

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You are provided with:

| labelled | contents | hazard | volume / $cm^3$ |
|---|---|---|---|
| **Benedict's** | Benedict's solution | irritant | 50 |
| **iodine** | iodine solution | stains | 30 |

If **Benedict's** or **iodine** come into contact with your skin, wash off immediately under cold water.
It is recommended that you wear suitable eye protection.

You will need to think about how you will carry out the tests so that you can determine the relative concentrations of the starch and reducing sugar.

**(i)** Decide how you will test each solution to show the relative concentration of starch present.

State the reagent you will use ..... .

Describe how you will carry out the test for starch.

.....

.....

State what you will record.

.....

Describe how you will determine which solution has the **highest concentration** of starch present.

.....
[2]

**(ii)** Decide how you will test each solution to show the relative concentration of reducing sugar present. You may measure the time taken to the first colour change.

State the reagent you will use ..... .

When testing for reducing sugar the volume of the reagent should be equal to or more than the volume of the sample.

Describe how you will carry out the test to measure the reducing sugar concentration.

.....

.....

.....

State how you will determine which solution has the **highest concentration** of reducing sugar present.

.....
[3]

1. Carry out the test for starch and the test for reducing sugar on each of the solutions, **S1**, **S2**, **S3** and **S4**.

   If the time taken to the first colour change for the reducing sugar test is longer than 180 seconds then record 'more than 180'.

**(iii)** Prepare the space below and record your results.

[5]

**(iv)** Using your results in **(b)(iii) and** using the information on page 2, complete Table 1.1 to show the identification of the samples, **S1**, **S2**, **S3** and **S4**.

**Table 1.1**

| sample | identification of sample |
|---|---|
| contains starch suspension which a person is about to eat | |
| from the mouth 2 minutes after being eaten | |
| from the stomach 10 minutes after being eaten | |
| from the small intestine 2 hours (120 minutes) after being eaten | |

[2]

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**(v)** Explain how you decided which sample was taken from the small intestine.

.....

.....

.....[1]

**(c)** A student wanted to obtain a **quantitative** estimate of the reducing sugar concentration in a sample.

Describe **how** the student could obtain a quantitative estimate of the concentration of reducing sugar in a sample.

.....

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 18]

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

You are not expected to be familiar with this specimen.

You are required to:

- use the eyepiece graticule to measure across the root
- use these measurements to calculate the length of the cortex as a percentage of the diameter of the root
- draw a plan diagram of half of the root.

**(a)** The eyepiece graticule in the microscope can be used to measure different tissues.

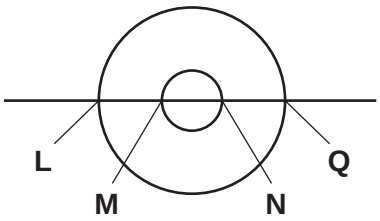



**Fig. 2.1**

**(i)** Use the eyepiece graticule in the microscope to measure across the diameter of the root as shown in Fig. 2.1:

**L** to **Q** = ..... eyepiece graticule units

**L** to **M** = ..... eyepiece graticule units

**M** to **N** = ..... eyepiece graticule units

**N** to **Q** = ..... eyepiece graticule units.

[3]

**(ii)** Use the measurements from **(a)(i)** to state:

the length across the diameter of the root (**L** to **Q**) ..... eyepiece graticule units

the length of cortex across the diameter ..... eyepiece graticule units

Calculate the length of cortex as a percentage of the diameter of the root.

You may lose marks if you do not show your working.

answer = .....% [3]

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*Use a sharp pencil for drawing.*

**(iii)** Use the measurements from **(a)(i)** to help you draw a large plan diagram of **half of the root** on **K1**, shown by the shaded area in Fig. 2.2.

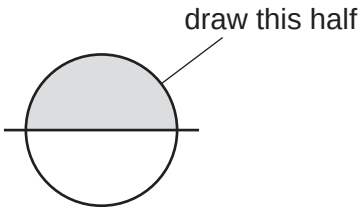



**Fig. 2.2**

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

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

[5]

**(iv)** Observe the central tissue in the root on **K1**. These cells are not identical.

Select one group of **four** adjacent (touching) cells which show some of the differences between these cells. 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)** The xylem vessel elements transport water and minerals from the roots to the leaves. This transport depends on the negative pressure in the xylem being greater than the force of gravity.

Scientists measured the xylem pressure at different heights in a tree. This was repeated for a number of trees of the same species.

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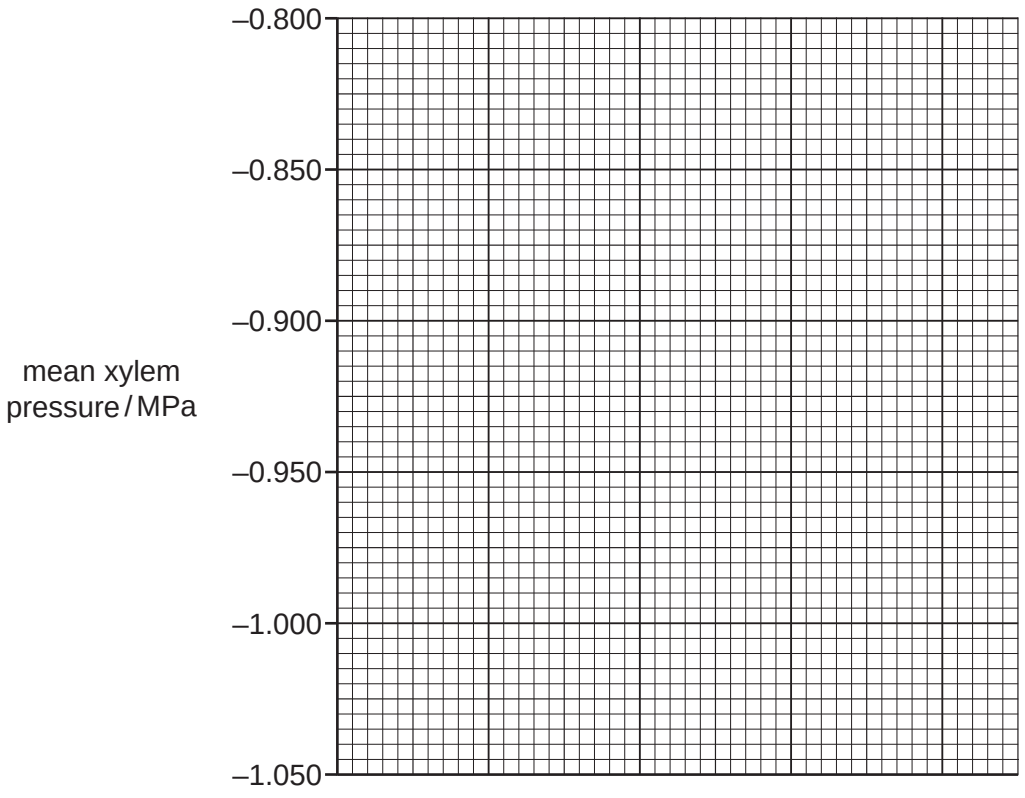
The scientist's mean results are shown in Table 2.1.

**Table 2.1**

| height / m | mean xylem pressure / MPa |
|---|---|
| 50.5 | –0.800 |
| 62.5 | –0.875 |
| 74.0 | –0.950 |
| 82.0 | –1.000 |
| 89.5 | –1.045 |

*Use a sharp pencil for graphs.*

**(i)** Complete **and** plot the graph of the data shown in Table 2.1.




[4]

**(ii)** Explain, using your knowledge of adhesion and cohesion, how water is transported through the xylem vessel elements in a tree with transpiring leaves.

.....

.....

.....

.....

.....[2]

[Total: 22]

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