UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

7325310788

BIOLOGY **9700/31**

Advanced Practical Skills 1 **May/June 2013**

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 ink.
You may use a pencil for any diagrams, graphs or rough working.
Do **not** use red ink, staples, paper clips, highlighters, 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 **12** printed pages.

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[Turn over

You are reminded that you have **only one hour** for each question in the practical examination.

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You should:

- read carefully through **the whole** of Question 1 and Question 2
- then plan your use of **the time** to make sure that you finish all the work that you would like to do.

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

1 You are provided with solutions **S1**, **S2**, **S3**, **S4** and **S5** which represent extracts from different tissues of a plant, including the xylem.

You are required to identify which biological molecule may be present in each of the plant extracts.

Four of the solutions contain one type of biological molecule, which could be:

- glucose
- protein
- starch
- sucrose.

Each solution contains **one** type of biological molecule, but the same type of biological molecule may be present in more than one of **S1**, **S2**, **S3**, **S4** and **S5**.
For example, glucose may be present in **S1 AND S2**.

The solution from the xylem does not contain any of these biological molecules.

You are provided with:

labelled	**hazard**	**volume / cm^3**
S1, **S2**, **S3**, **S4** and **S5**	none	25

Proceed as follows:

(a) (i) As you carry out each test to identify the presence or absence of the biological molecule in **S1**, **S2**, **S3**, **S4** and **S5**, complete the following:

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Decide which biological molecule to identify in the **first test**.

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First test: Test for .....

Describe how you used the reagents to carry out this test.

.....

.....

.....

Carry out the **first test** and record your observations.

solutions tested	observations of colour

Use these observations to complete the sentence.

Solution(s) ..... contain(s) the biological molecule ..... .

Decide which biological molecule to identify in the **second test**.

Second test: Test for .....

Describe how you used the reagents to carry out this test.

.....

.....

.....

Carry out the **second test** and record your observations.

solutions tested	observations of colour

Use these observations to complete the sentence.

Solution(s) ..... contain(s) the biological molecule ..... .

Decide which biological molecule to identify in the **third test**.

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Third test: Test for .....

Describe how you used the reagents to carry out this test.

.....

.....

.....

Carry out the **third test** and record your observations.

solutions tested	observations of colour

Use these observations to complete the sentence.

Solution(s) ..... contain(s) the biological molecule ..... .

Decide which biological molecule to identify in the **fourth test**.

For Examiner's Use

Fourth test: Test for .....

Describe how you used the reagents to carry out this test.

.....

.....

.....

Carry out the **fourth test** and record your observations.

solutions tested	observations of colour

Use these observations to complete the sentence.

Solution(s) ..... contain(s) the biological molecule ..... .

From these observations, the remaining solution ..... contains

..... .

[15]

(ii) Identify which of the solutions **S1**, **S2**, **S3**, **S4** and **S5** is most likely to be the plant extract from the **phloem**.

.....[1]

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A student identified the presence of reducing sugars in two plant extracts and was then required to find the **concentration** of reducing sugars in the two plant extracts.

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(b) Describe how the student would find the concentration of reducing sugars in each plant extract.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 19]

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Question 2 starts on page 8

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2 Fig. 2.1 shows a photomicrograph of a transverse section through part of a plant stem showing the eyepiece graticule scale as seen using a microscope.

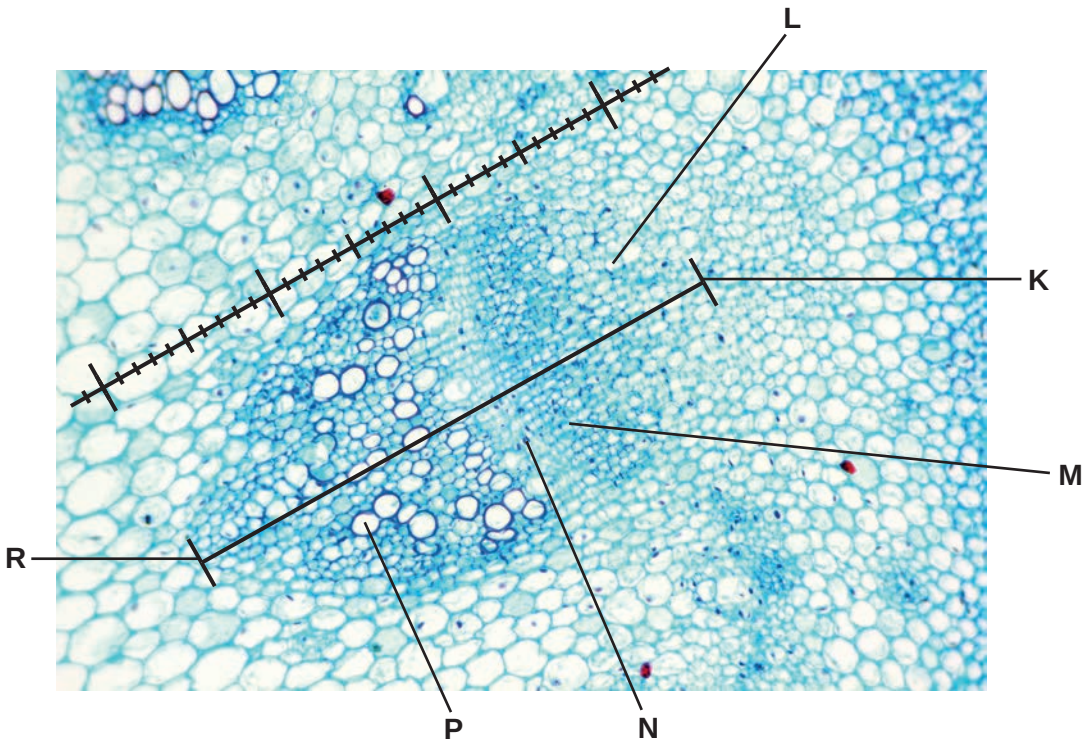


Fig. 2.1

An eyepiece graticule scale can be used to measure the layers of tissues and to help draw a plan diagram with the correct shape and proportions of the tissues, without needing to calibrate the eyepiece graticule scale.

(a) (i) The length of the vascular bundle (from **K** to **R**) in Fig. 2.1 was measured using the eyepiece graticule scale and recorded in Table 2.1.

Table 2.1

layer	**L**	**M**	**N**	**P**	length from **K** to **R**
number of eyepiece graticule scale divisions					30

Complete Table 2.1 by finding the thickness of each of the different layers, **L**, **M**, **N** and **P** using the line between **K** and **R** and the eyepiece graticule scale. [2]

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The length (from **K** to **R**) of the vascular bundle in eyepiece graticule divisions was used to make a scale drawing of the outline of the vascular bundle as shown in Fig. 2.2.

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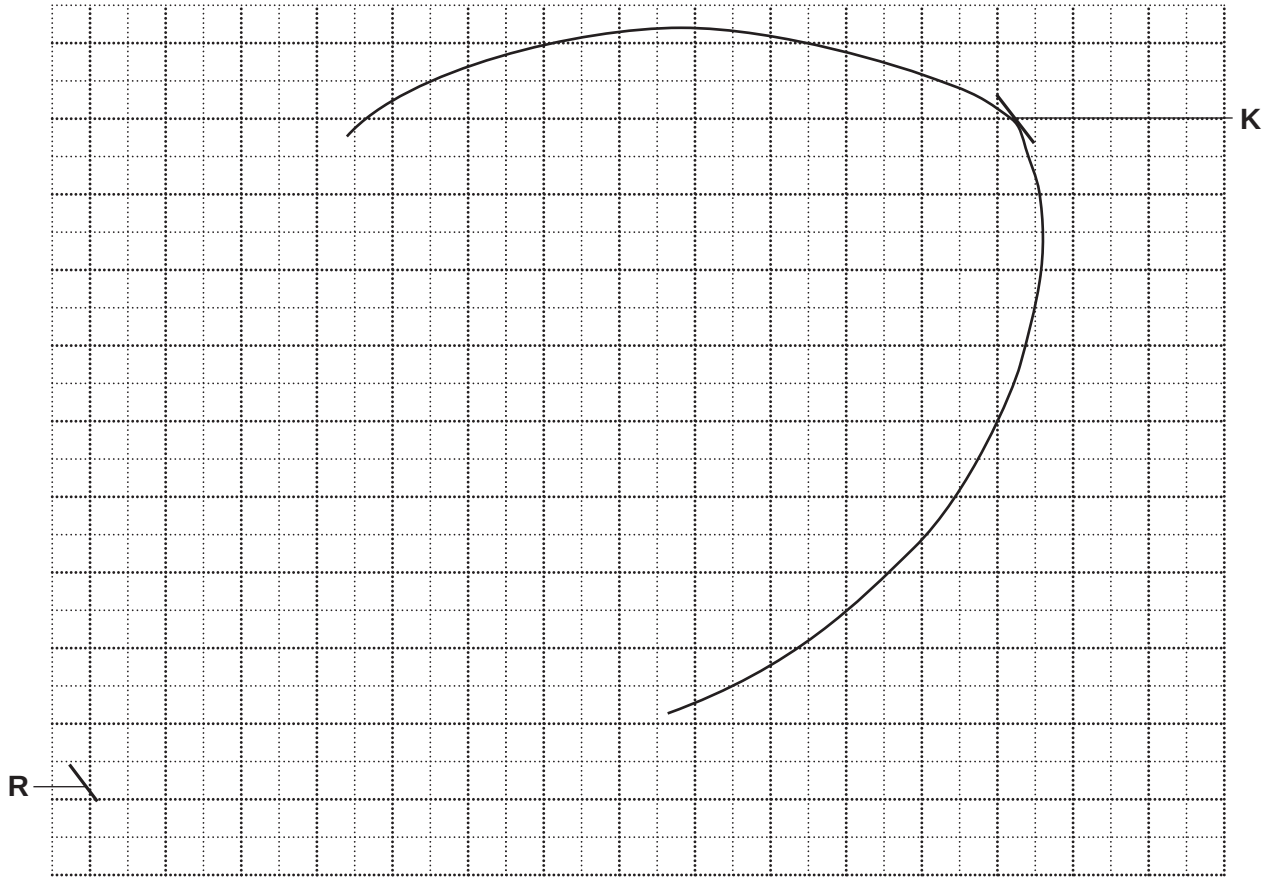


Fig. 2.2

(ii) Complete the plan diagram of the vascular bundle to show the proportion and shape of each of the tissues. Use the values in Table 2.1 to help you. [3]

(iii) Using Fig. 2.2, count the total number of 1 cm by 1 cm squares occupied by the vascular bundle and count the total number of 1 cm by 1 cm squares occupied by the xylem.

Count any 'half square' or 'more than half' as one square.

State the ratio of the area occupied by the vascular bundle to that of the xylem.

You will lose marks if you do not **show** all the steps in finding the ratio, including indicating counted squares on Fig. 2.2.

ratio .....[2]

Some scientists investigated the rate of transpiration during part of a day.

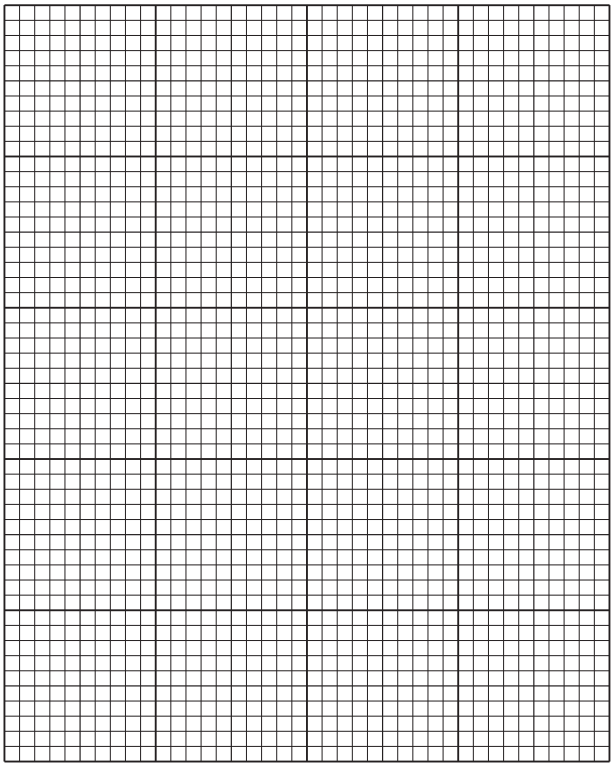
The results are shown in Table 2.2.

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Table 2.2

time of day / hours	rate of transpiration / g cm^{-2} hr^{-1}
06.00	0.6
08.00	1.9
10.00	2.2
12.30	2.2
15.00	1.5
18.30	0.4

(b) (i) Plot a graph of the data shown in Table 2.2. [4]



(ii) From your graph, state the rate of transpiration at 14.30 hours.

Show on your graph where you obtained the rate of transpiration.

.....[1]

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J1 is a slide of a transverse section through another plant stem. This plant grows mainly in Europe and Asia.
This stem shows a layer of stained cells close to the epidermis and just beneath these cells is another tissue close to the vascular bundles.

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(c) Make a large drawing of one group of **three** whole adjacent (touching) cells

- from the layer of stained cells close to the epidermis, as observed on the specimen **J1**.

Make a large drawing of one group of **three** whole adjacent (touching) cells

- from the cells between the layer of stained cells and the vascular bundles, as observed on the specimen **J1**.

The drawings should show any difference in size (linear magnification) observed between each group of cells.

layer of stained cells

cells between the layer of stained cells and the vascular bundles

[4]

Question 2 continues on page 12

Fig. 2.3 shows a photomicrograph of a transverse section through part of a different plant stem.

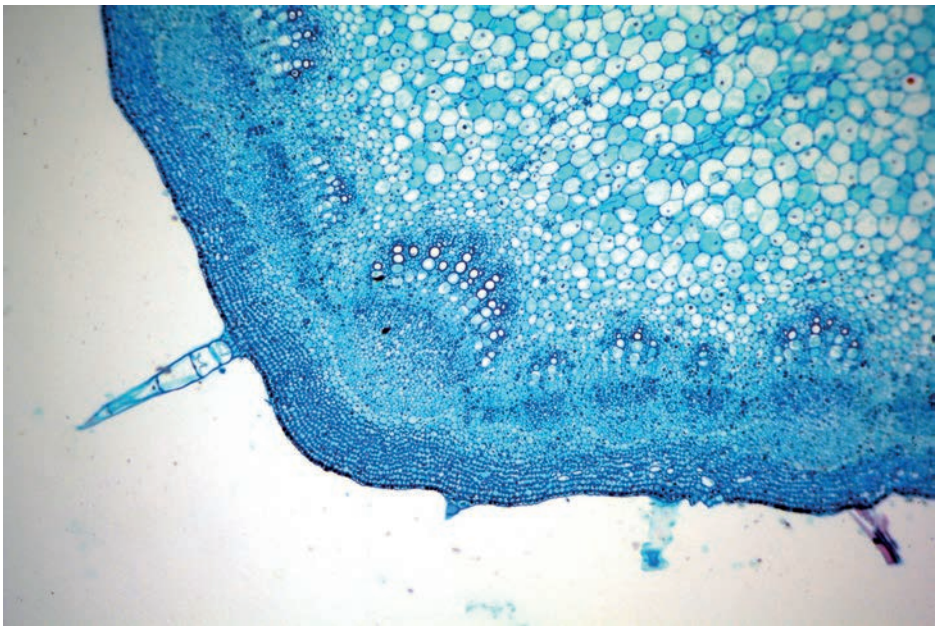


Fig. 2.3

(d) Prepare the space below so that it is suitable for you to record the observable differences between the specimen on slide **J1** and in Fig. 2.3 to include:

- the vascular tissue
- at least two other tissues.

[5]

[Total: 21]

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