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

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **9700/33**

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 **11** printed pages and **1** blank page.

BLANK PAGE

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

For Examiner's Use

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 Enzyme, **E** hydrolyses (breaks down) one substrate (biological molecule) present in one of the solutions **S1**, **S2** or **S3**.

You are required to:

- identify which biological molecule may be present in each solution, **S1**, **S2** and **S3**
- identify which of the biological molecules in the solutions **S1**, **S2** and **S3** can be hydrolysed by **E.**

The solutions contain one type of biological molecule which may be:

- glucose
- 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** and **S3**.
For example glucose may be present in **S1 AND S2**.

You are provided with:

labelled	**hazard**	**volume / cm^3**
S1, **S2** and **S3**	none	25
E	irritant	15

Read to the end of page 6 before proceeding.

Proceed as follows:

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

Question 1(a) continues on page 4

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

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 test you will use to **check** the identity of the **third** biological molecule.

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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 observation.

solution tested	observation of colour

Use this observation to complete one of the following sentences.

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

OR

Solution ..... does not contain any of these biological molecules, glucose, starch or sucrose.

[11]

Enzyme, **E** hydrolyses (breaks down) one biological molecule (substrate) present in **one** of the solutions **S1**, **S2** or **S3**.

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(b) (i) State which of the biological molecules, glucose, starch or sucrose **cannot** be hydrolysed by the enzyme, **E**.

.....[1]

You are required to identify which of the other **two** biological molecules is hydrolysed by the enzyme, **E** using the procedure shown in Fig. 1.1 on **each** solution.

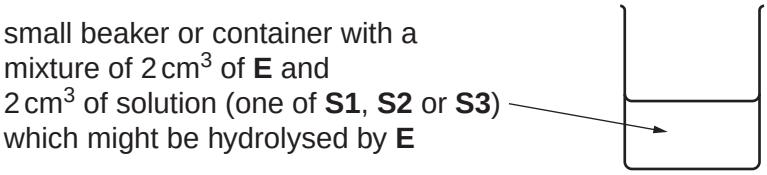

Fig. 1.1

Set up two beakers as shown in Fig. 1.1.
Leave the mixtures for 5 minutes so that **E** can carry out the hydrolysis.
After 5 minutes, test the mixtures to find out whether **E** has hydrolysed the biological molecule to its products.

(ii) Prepare the space below to record:

- the biological molecule tested for
- the observations.

[4]

(iii) From your observations, state which of the solutions (**S1**, **S2**, **S3**) is hydrolysed by the enzyme, **E**. Explain the reason for your answer.

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solution .....

reason .....
[1]

(c) Describe **how** you would modify this procedure to investigate the effect of temperature on the enzyme, **E**.

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 20]

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.

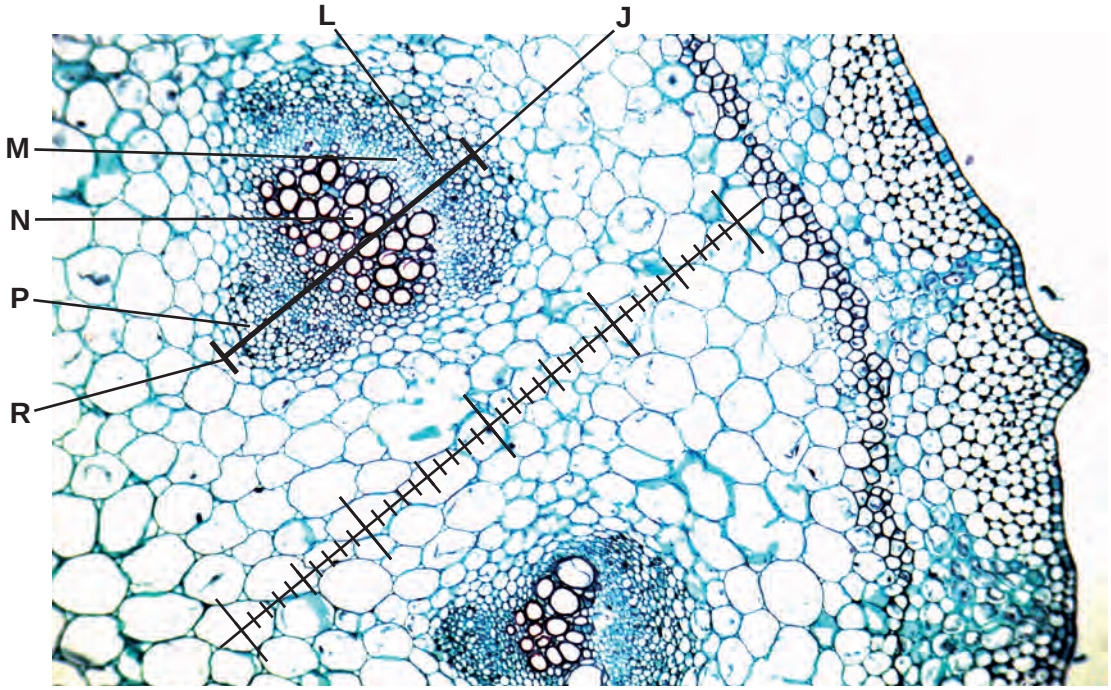

Fig. 2.1

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 **J** 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 **J** to **R**
number of eyepiece graticule scale divisions					20

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

The length (from **J** 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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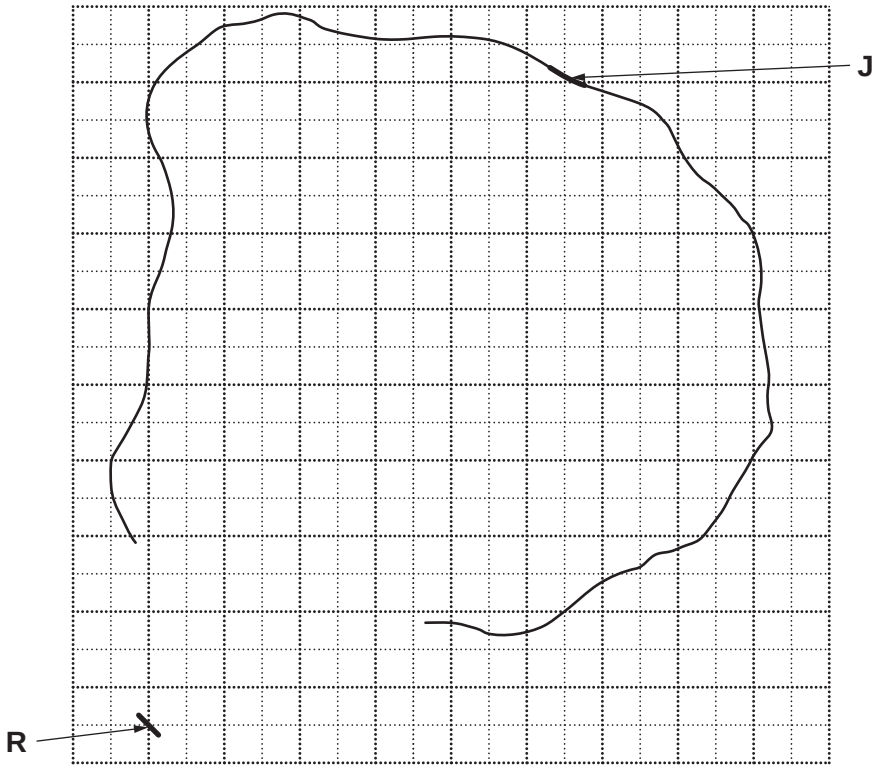

Fig. 2.2

(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 1cm by 1cm squares occupied by the vascular bundle and count the total number of 1cm by 1cm 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]

K1 is a slide of a transverse section through another plant stem.
This plant grows mainly on the African continent.
This stem shows small vascular bundles close to the epidermis and then larger vascular bundles nearer to the centre.

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(b) Draw a large plan diagram of a sector of the specimen on **K1** to show:

- the epidermis
- three small vascular bundles beneath the epidermis
- one large vascular bundle nearer to the centre
- other observable features.

[3]

Fig 2.1 is shown again here to help you answer **(c)**.

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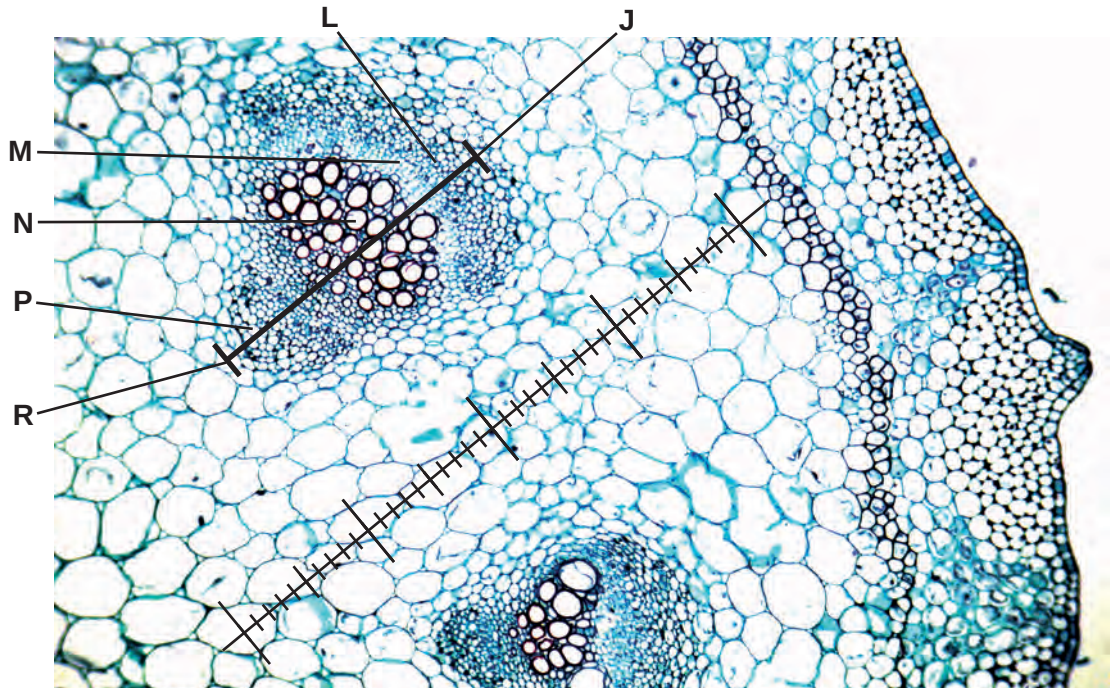

Fig. 2.1

(c) Select observable features shown on the specimen on **K1** which are different from or **not** observable in Fig. 2.1.

Prepare the space below so that it is suitable for you to record each feature **and describe** how each feature is different from Fig. 2.1.

[4]

Question 2 continues on page 12

Some scientists investigated the flow rate in xylem during 22 hours.
The results are shown in Table 2.2.

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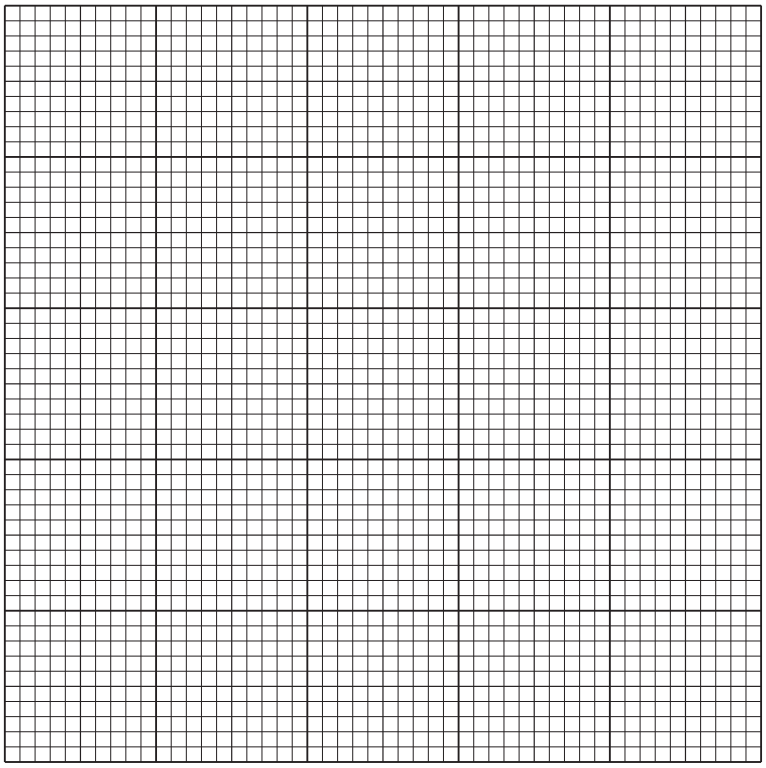
Table 2.2

time of day / hours	flow rate in xylem / mg min^{-1}
00.00	0.140
06.00	0.105
09.00	0.220
17.00	0.455
22.00	0.200

(d) (i) Plot a graph of the data shown in Table 2.2.



[4]

(ii) Use the data to describe the trend in the flow rate in the xylem between 10.00 and 17.00 hours.

.....

.....

.....[2]

[Total: 20]