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

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

6651147019

BIOLOGY **9700/35**

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

DC (LEO/SW) 52069/8

UNIVERSITY of CAMBRIDGE International Examinations

[Turn over

For Examiner's Use

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

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 Glucose solutions change the colour of pink potassium manganate(VII) solution, **PM**.

Fig. 1.1 shows the colour change from pink to the colourless end-point.

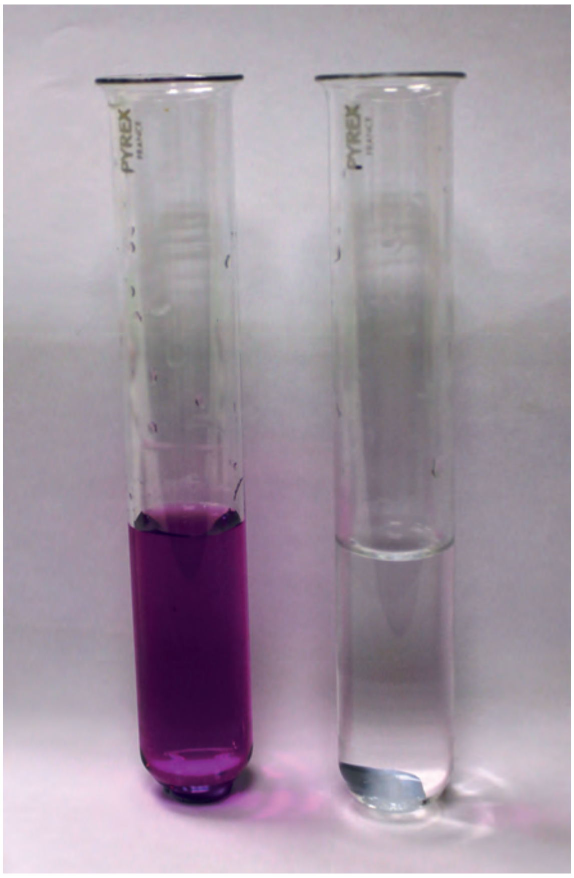


Fig. 1.1

The rate of the colour change depends on the concentration of the glucose solution. The greater the concentration of glucose solution the faster the end-point is reached.

You are required to:
- make different concentrations of glucose solution
- find, for each glucose solution, the time taken for **PM** to change to colourless
- estimate the unknown concentrations of the glucose solutions, **U1** and **U2**.

You are provided with:

labelled	contents	hazard	volume / cm^3
G	20% glucose solution	none	100
W	distilled water	none	200
S	sulfuric acid	**harmful**	40
PM	potassium manganate(VII) solution	**harmful**	20
U1	glucose solution	none	20
U2	glucose solution	none	20

Sulfuric acid and potassium manganate(VII) solution are harmful.
If any comes into contact with your skin, wash immediately under cold water.
It is recommended that you wear safety goggles/glasses.

Proceed as follows:

1. Using the 20% glucose solution, **G**, as a starting concentration you are required to make up 20 cm^3 of each of four different concentrations of glucose solutions, 6%, 8%, 10%, 12%.

(a) (i) Complete Table 1.1 to show how you will make the four glucose solutions 6%, 8%, 10% and 20%.

Table 1.1

volume of 20% glucose solution / cm^3	volume of distilled water / cm^3	final percentage concentration of glucose
		6
		8
		10
12	8	12

[2]

2. Make all the glucose solutions as in Table 1.1, in the containers provided.

3. Put 10 cm^3 of each glucose solution into four separate test-tubes.

4. Using the syringe labelled **S**, put 5 cm^3 of **S** into each test-tube. Insert the bung and, with your finger holding the bung in place, gently mix the solution in each test-tube. Do **not** turn the test-tube upside-down.

For Examiner's Use

For Examiner's Use

When adding **PM** to the first glucose solution, you must **not** stop the timer, **just record the time**. When adding **PM** to the other glucose solutions, or at any of the end-points, do **not** stop the timer, just record the time.

From your timer readings you will be required to calculate the time taken to reach the end-point in each test-tube.

(ii) Consider the units of the values recorded on your timer or clock.

State the:

- smallest value which your timer or clock shows ....
- smallest unit of time you have decided to record ....

[1]

Read up to step 11 before proceeding.

Proceed as follows:

5. Using the syringe labelled **PM**, put 2 cm^3 of **PM** into the test-tube containing the lowest concentration of glucose solution as shown in Fig. 1.2.

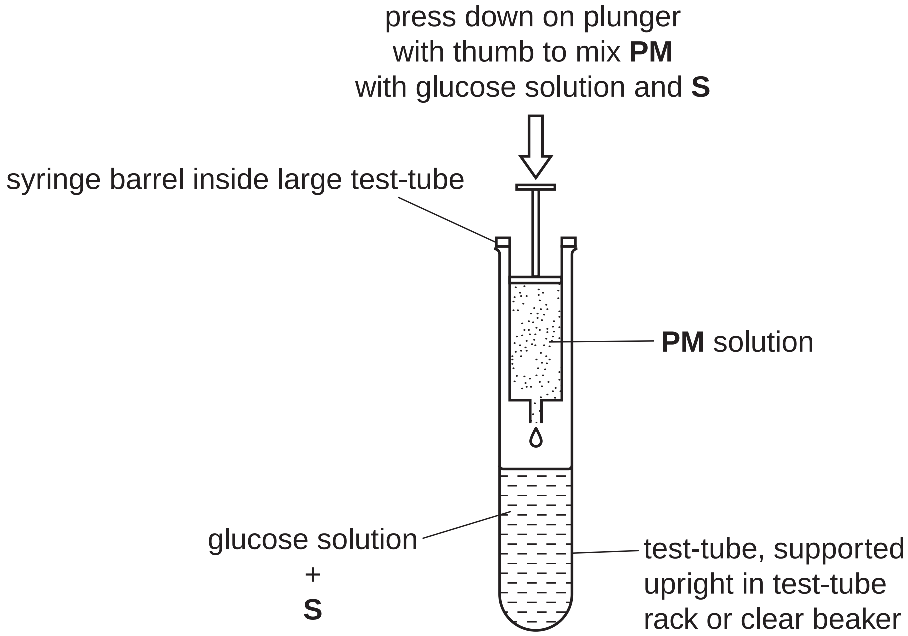


Fig. 1.2

6. Start timing and record the start time from your timer on Fig. 1.3 on page 5.

7. Immediately, put 2 cm^3 of **PM** into the test-tube containing next highest concentration of glucose solution.

8. Record start time from your timer on Fig. 1.3 on page 5.

9. Immediately, repeat steps 7 and 8 for the remaining concentrations of glucose solution.

10. Observe the four test-tubes and record the time on Fig. 1.3 when each end-point is reached.

For Examiner's Use

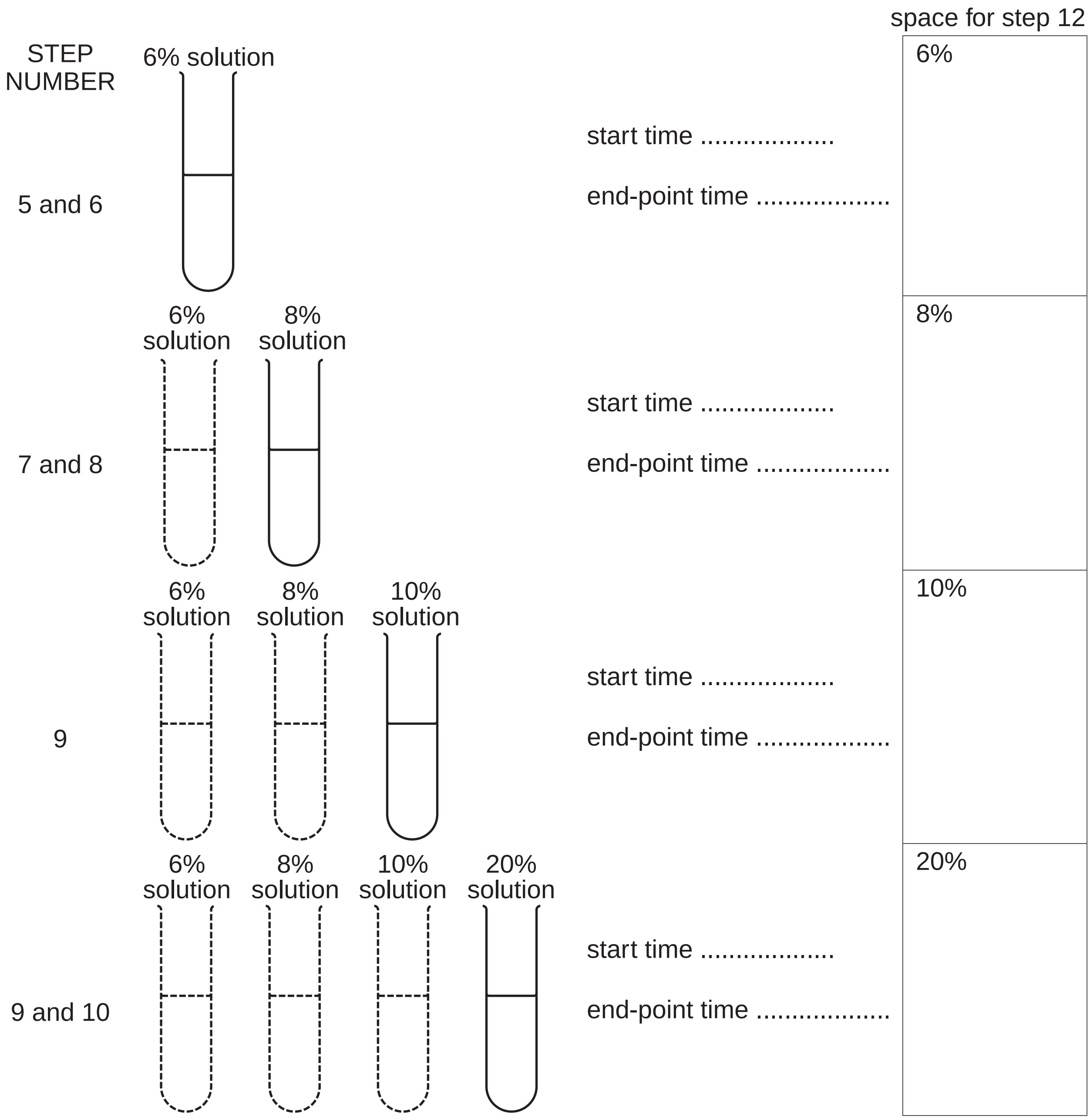


Fig. 1.3

For Examiner's Use

You are required to estimate the glucose concentration of solutions, **U1** and **U2** using the same procedure.

(iii) State one variable, which you will standardise when setting up the test-tubes to find the end-points for **U1** and **U2**.

....

....[1]

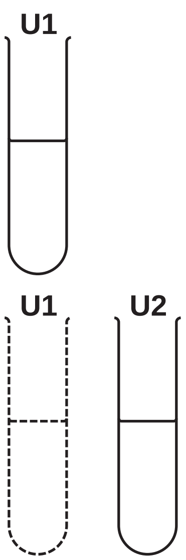
(iv) Describe how you will standardise this variable.

....

....[1]

11. Use the same procedure to obtain the end-points for the solutions, **U1** and **U2** and record your times on Fig. 1.4.

space for step 12



U1

start time ....

end-point time ....

U2

start time ....

end-point time ....

Fig. 1.4 [3]

For Examiner's Use

Depending on the timer or clock you have used, you may find the following examples helpful so that you can process your results for **(v)** and for Step 12 to find the time taken to reach the end-point.

Example 1: using stop-clock or stopwatch

start time end-point time	minutes:seconds 1:24 2:55	 = 84 seconds = 175 seconds
time taken to reach end-point		= 91 seconds

Example 2: using clock times

start time end-point time	hours:minutes:seconds 9:10:00 9:11:31	 difference in time 1 minute 31 seconds
time taken to reach end-point		= 91 seconds

(v) Using your results **from Fig. 1.3**, complete Table 1.2 to show the calculation to find the time taken for 6% glucose solution to reach the end-point.

Table 1.2

6% solution start time 6% solution end-point time		
time taken to reach end-point =		

[1]

12. Use the space on Fig. 1.3 and Fig. 1.4 for processing your readings to find the time taken to reach the end-point for the other glucose solutions, and for **U1** and **U2**.

For Examiner's Use

(vi) Using **only** these processed results, prepare the space below to record the time taken to reach the end-point for **all six** solutions.

[4]

Glucose solutions may be used for different purposes, for example:

Glucose tolerance test solutions, containing 25% glucose.

Sports drink solutions, containing 8% glucose.

Oral Rehydration solutions, containing 2% glucose.

(b) Suggest which of the above solutions is **U2**.

....[1]

For Examiner's Use

(c) (i) Identify **one** significant source of error in your investigation.

....

....

.... [1]

(ii) Describe **two** modifications to this investigation which would improve the confidence in your results.

....

....

....

....

....

....

.... [2]

[Total: 17]

Question 2 starts on page 10

For Examiner's Use

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

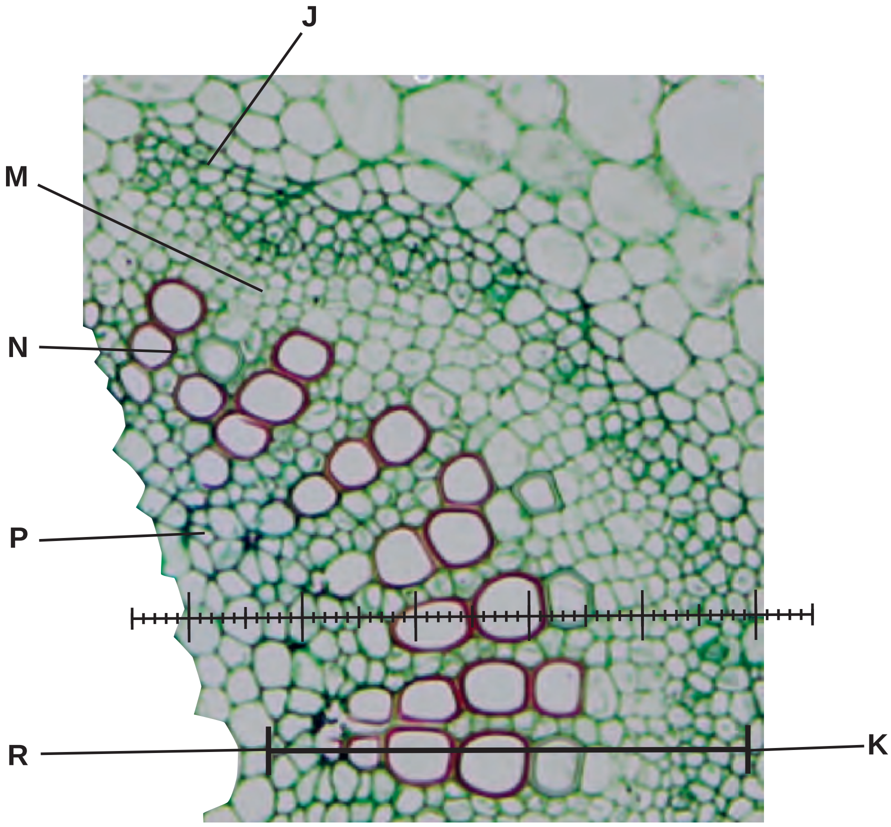


Fig. 2.1

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	**J**	**M**	**N**	**P**	length from **K** to **R**
number of eyepiece graticule scale divisions					43

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

For Examiner's Use

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.

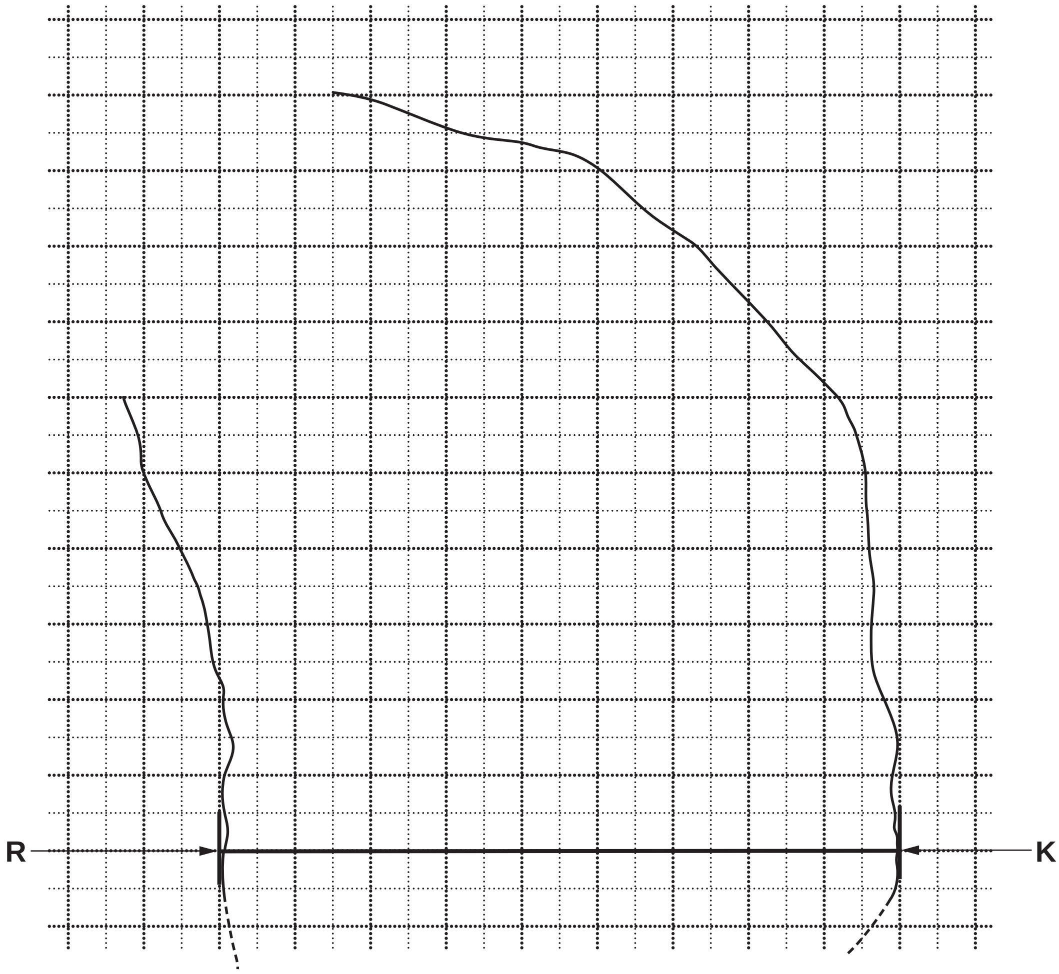


Fig. 2.2

(ii) Complete the plan diagram of this part of the vascular bundle to show the proportions 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 tissue.

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 tissue.

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]

L1 is a slide of a transverse section through the same plant stem as in Fig. 2.1.
This plant grows mainly in Europe and Asia.
This stem shows a stained tissue, close to the epidermis, in the four corners of the stem.
Near to the centre of the stem is a different tissue.

For Examiner's Use

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

- from the tissue in one corner, as observed on the specimen on **L1**.

Make a large drawing of one group of **three** whole, adjacent cells

- from the tissue near to the centre of the stem, as observed on the specimen on **L1**.

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

On your drawing, use a ruled label line and label to show one cell wall.

cells from the tissue in one corner

cells from the tissue near to the centre of the stem

[5]

Fig. 2.3 is a photomicrograph of a transverse section through a stem of a different plant species.

For Examiner's Use

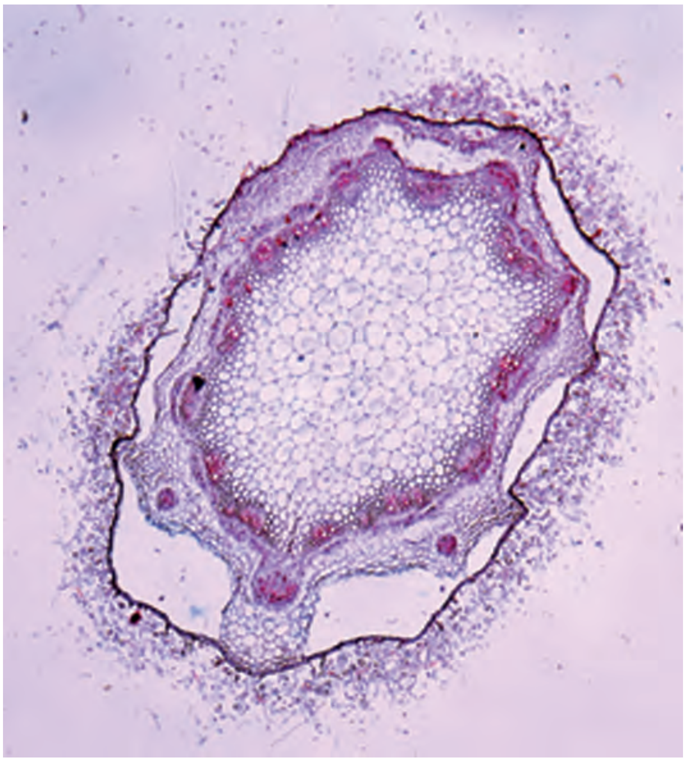


Fig. 2.3

(c) Prepare the space below so that it is suitable for you to record observable differences between the specimens on slide **L1** and in Fig. 2.3 to include:

- the vascular tissue
- at least two other tissues.

[4]

For Examiner's Use

Some scientists carried out an investigation into the **uptake** of glucose by five different types of plant tissues during the course of 25 minutes.

A piece of each type of plant tissue was placed in a solution of glucose.
The starting concentration of this glucose solution was 0.8 arbitrary units which was lower than the concentration inside the plant cells in each tissue.

The results **after 25 minutes** are shown in Table 2.2.

Table 2.2

type of plant tissue	concentration of glucose in the cells / arbitrary units
A	2.0
B	6.5
C	4.2
D	5.6
E	3.2

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

[4]

For Examiner's Use

(ii) Describe and explain the results shown in the chart you have drawn.

....

....

....

....

....

....

.... [3]

[Total: 23]

BLANK PAGE