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

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

3918523845

BIOLOGY **9700/33**

Advanced Practical Skills 1 **October/November 2010**

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 **both** questions.

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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You are reminded that you have only one hour for each question in the practical examination. You should read carefully through the whole of each question and then plan your use of the time to make sure that you finish all of the work that you would like to do.

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

1 When plant tissue is soaked in methylene blue the tissue takes up the stain and is coloured blue.

Copper sulfate solution affects the selective permeability of cell membranes.

You are provided with

labelled	contents	hazard	concentration / %	volume / cm^3
C	copper sulfate solution	harmful irritant	0.3	60
W	distilled water	none	–	100

labelled	contents	hazard	details	quantity
P	stained plant tissue	methylene blue will stain your skin	same cross-sectional area, stained with methylene blue and washed	5

If any methylene blue comes into contact with your skin wash off immediately with water.

It is recommended that you wear safety goggles/glasses.

You are required to investigate the effect of the independent variable, concentration of copper sulfate solution, on samples of plant tissue which have been soaked in methylene blue.

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(a) (i) Decide on the concentrations of copper sulfate solution you will use in your investigation.

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You will need 10 cm^3 of each concentration of copper sulfate solution.

Prepare the space below to show

- the concentrations of copper sulfate solution
- the volumes of copper sulfate solution
- the volumes of distilled water.

[3]

Make up the copper sulfate solutions that you have chosen in the containers provided.

Put 10 cm^3 of the appropriate concentration of copper sulfate solution into a labelled test-tube.

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[Turn over

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You are provided with five pieces of plant tissue with the same cross-sectional area in a container of water, labelled **P**.

Proceed as follows:

(Always use blunt forceps when handling the plant tissue to avoid contact with the methylene blue).

1. Remove the pieces of plant tissue from the container, labelled **P**, and place them onto a white tile.

   You will need to prepare one sample of plant tissue to put into each of the concentrations of copper sulfate solution.

(ii) State which variable you will need to control when preparing the plant tissue samples.

.....[1]

(iii) Describe how you will control this variable and prepare the samples of plant tissue.

.....

.....[2]

2. Prepare the samples of plant tissue as you described in **(iii)**.

3. Empty the coloured water from the container, labelled **P**.

4. Place the samples back into the empty container, labelled **P**.

5. To remove excess methylene blue change the water five times, either using a syringe or by pouring off the water. Do not touch the plant tissue.

6. Remove the samples of plant tissue and add one sample of plant tissue to each test-tube of copper sulfate solution.

7. Immediately start timing.

8. Observe the test-tubes for 5 minutes and record your observations.

9. After five minutes, mix the contents of the test-tubes, by inserting a bung and inverting each test-tube.

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(iv) Prepare the space below and record your observations.

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[5]

(v) Suggest how copper sulfate solution affects plant cell membranes.

.....

.....[1]

(vi) Identify **three** significant sources of error in your investigation.

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.....[3]

(vii) Suggest how you would make **three** improvements to this investigation.

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.....[3]

[Total: 18]

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

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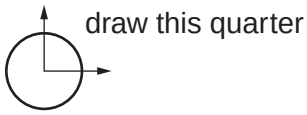


Fig. 2.1

(a) **(i)** Draw a large plan diagram of a quarter of the specimen as shown in Fig. 2.1.

Label the endodermis and the cortex.

[5]

(ii) Make a high-power drawing of one large xylem vessel and the single layer of cells touching a quarter of the vessel's circumference.

Labels are not required.

[5]

Fig. 2.2 is a photomicrograph of a transverse section through a quarter of a different organ from the same plant species.

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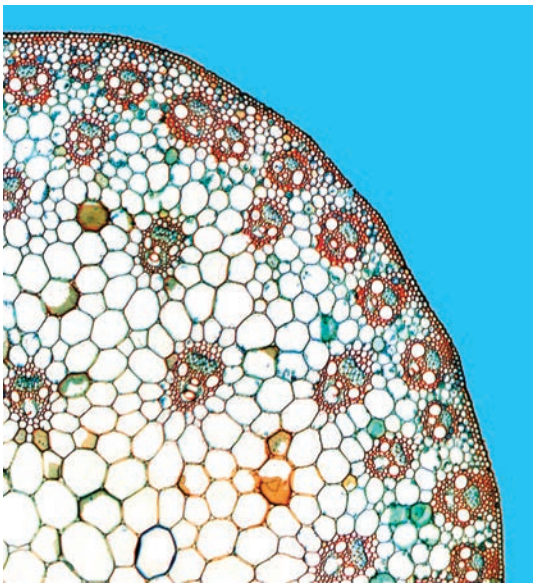


Fig. 2.2

(b) Prepare the space below so that it is suitable for you to record the observable differences between the specimens on **K1** and that in **Fig. 2.2**.

Record your observations in the space you have prepared.

[4]

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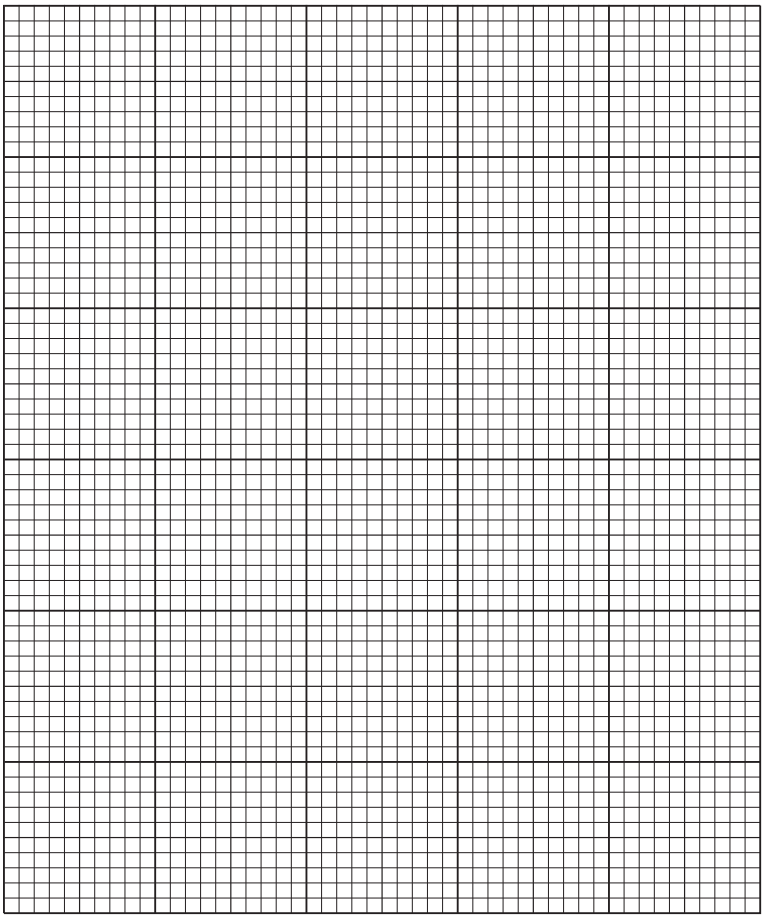
(c) (i) Table 2.1 shows the results of an investigation into the contents of phloem sieve tube elements.

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Table 2.1

contents	concentration in phloem sieve tube elements / $\mu g\,cm^{-3}$
sucrose	120
ammonium ions	45
calcium ions	85
magnesium ions	105
sodium ions	115

Plot a chart of the data shown in Table 2.1.



[4]

(ii) The contents of the xylem vessels were also investigated and the concentration of calcium ions was found to be 190 $\mu g\,cm^{-3}$.

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Use the result for the xylem vessels and the data from Table 2.1 to calculate the percentage difference between the concentration of calcium ions in the xylem vessels and the concentration of calcium ions in the phloem sieve tube elements.

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

[2]

(d) The investigation into xylem vessel contents also found that there was no sucrose present.

Suggest why there is 120 $\mu g\,cm^{-3}$ of sucrose in the phloem sieve tube elements.

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..... [2]

[Total: 22]

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