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

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

5275197129

BIOLOGY **9700/35**

Advanced Practical Skills 1 **May/June 2011**

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.

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.

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1	
2	
Total	

This document consists of **11** printed pages and **1** blank page.

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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 each question.
- 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 When plant tissue is soaked in methylene blue the tissue is coloured blue.
Ethanol affects the selective permeability of cell membranes.

You are provided with:

labelled	contents	hazard	concentration / %	volume / cm^3
E	ethanol	flammable	10	40
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	3 pieces

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

It is recommended that you wear safety goggles/glasses.

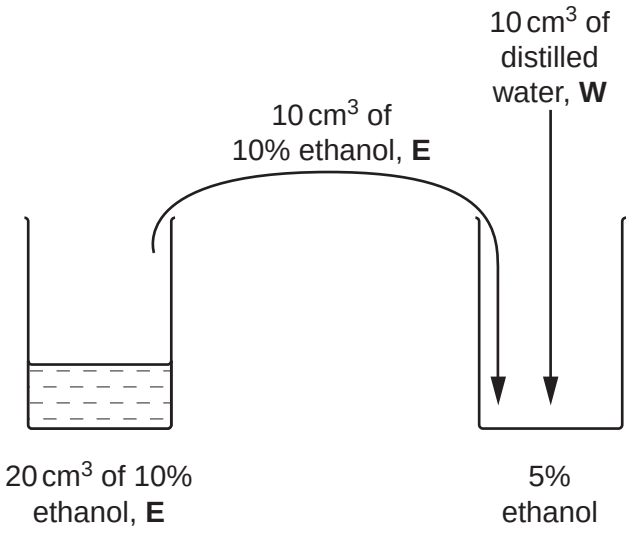
You are required to investigate the effect of the independent variable, ethanol concentration, on samples of plant tissue which have been soaked in methylene blue.

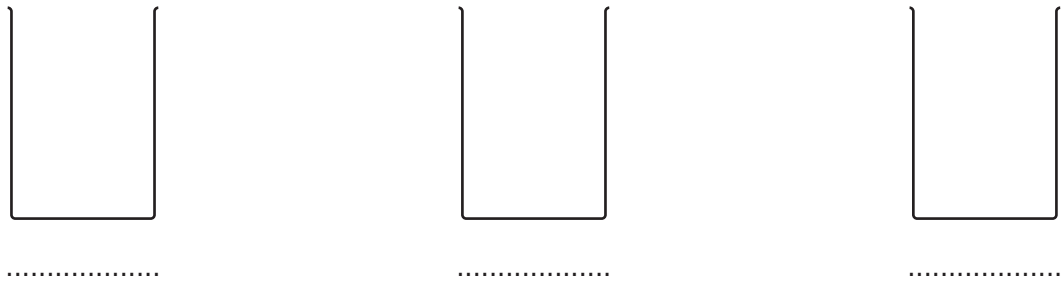
You are required to carry out a serial dilution of ethanol, **E**, to reduce the concentration of the ethanol by half between each successive dilution.

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Fig. 1.1 shows how to make the first concentration of 5% ethanol.

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....

Fig. 1.1

(a) (i) Complete Fig. 1.1 to show how you will make **three** further concentrations of ethanol, **E**. [3]

As part of this investigation you are required to set up a suitable control.

(ii) Describe how you will set up this control using the apparatus provided.

.....

..... [1]

Proceed as follows

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

1. Prepare the concentrations of **E** as shown in Fig. 1.1 in the containers provided.
2. Label test-tubes with the concentrations of **E** and the **control**.
3. Put 5 cm^3 of each dilution of **E** and the control into the labelled test-tubes.

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

5. Cut the ends off each piece of plant tissue.

6. Cut the plant tissue into **equal** lengths. These should be between 0.75 and 1 cm in length. The pieces should not get stuck to the side of the test-tube.

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

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

9. 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.

10. Remove the pieces of plant tissue from the beaker of water and place them on a paper towel to blot off excess water.

11. Add one piece of plant tissue to each test-tube and immediately start timing.

12. Observe the test-tubes after 10 minutes. You may find it helpful to mix the contents.

13. Record your observations.

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

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[4]

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(iv) You used syringes to measure the volumes of the ethanol used.

State the volume of the smallest division on the syringe .....

State the degree of uncertainty in using the syringe to measure the volumes.

.....[1]

(v) Explain the effect of the ethanol on the plant tissue.

.....

.....

.....

.....

.....

.....

.....[3]

(vi) In step 5, the ends of the pieces of plant tissue were cut off.
If the ends had not been cut off how would the results have been affected?

.....

.....[1]

A student carried out a similar investigation into the effect of pH on samples of coloured plant tissue. The samples were placed in different buffer solutions. After 10 minutes, the samples were removed. The buffer solutions were placed in a colorimeter to measure the percentage absorbances.

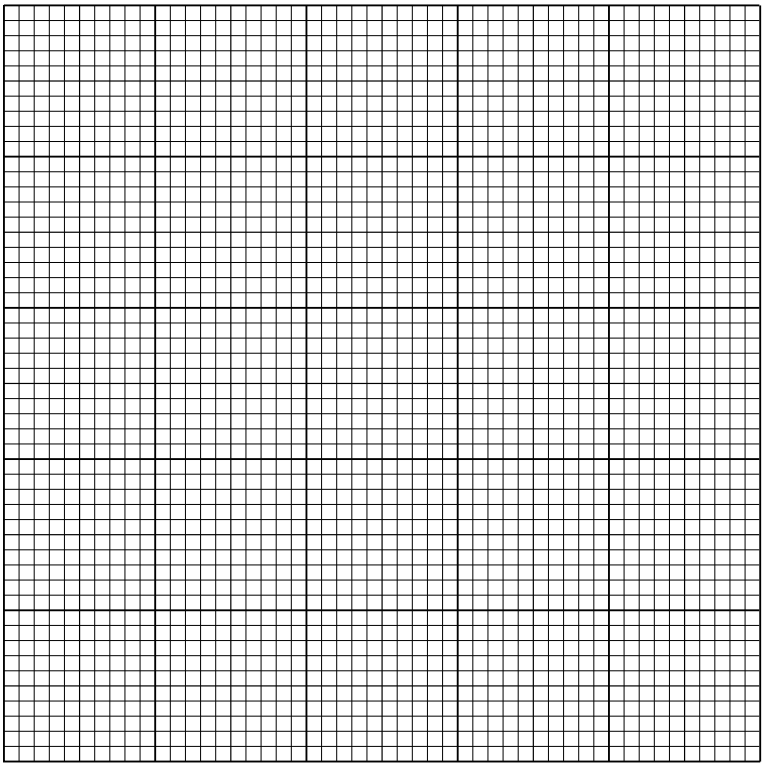
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The results of this investigation are shown in Table 1.1.

Table 1.1

pH of buffer solutions	absorbance / %
4.0	83
6.0	39
7.3	10
7.8	38
8.5	78

(b) (i) Plot a graph of the data shown in Table 1.1.



[4]

(ii) Another sample of plant tissue was placed in a buffer solution and the absorbance was 46%. Use your graph to estimate the pH of the buffer solution at this absorbance.

.....

..... [2]

(iii) State **two** variables that need to be kept the same in this investigation. Describe how to keep each of these variables the same.

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.....[3]

[Total: 22]

2 Fig. 2.1 is a photomicrograph of a transverse section through a root.

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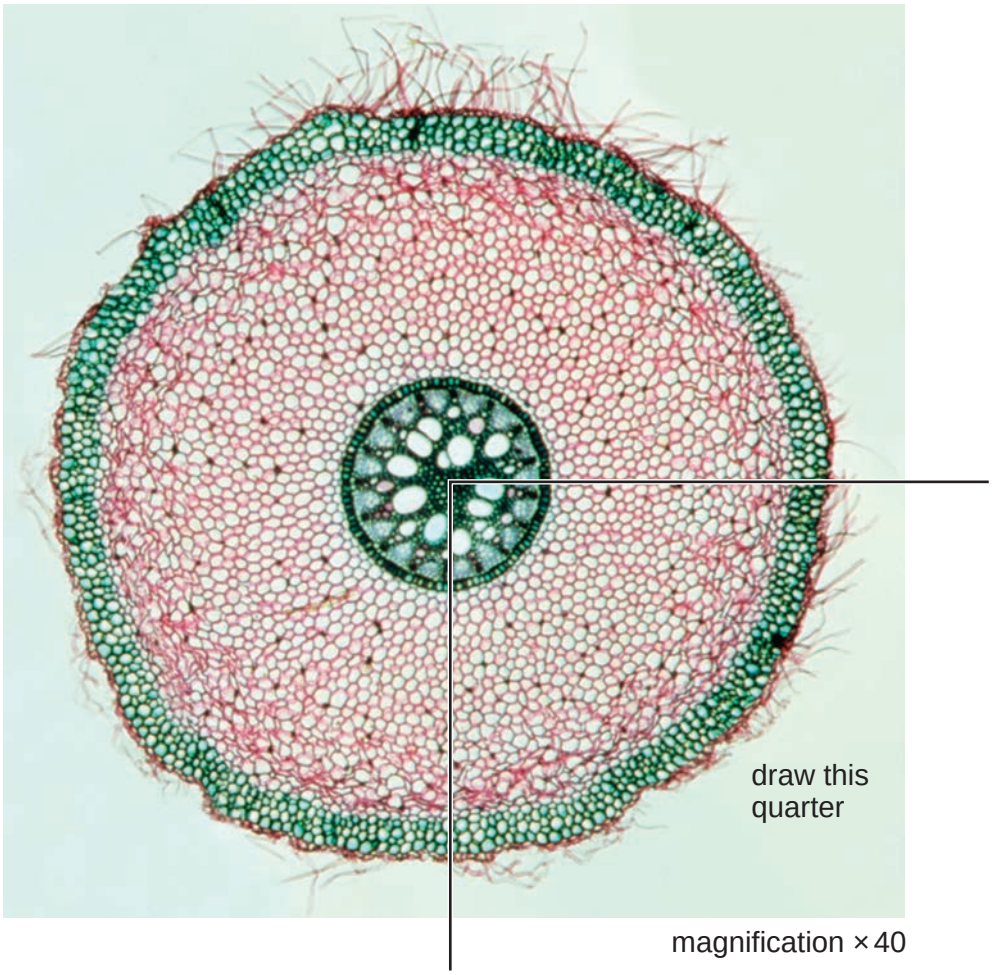


Fig. 2.1

(a) Draw a large plan diagram of the quarter shown in Fig. 2.1.

Label the xylem.

[5]

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Fig. 2.2 is a photomicrograph of a transverse section through a root of a different plant species.

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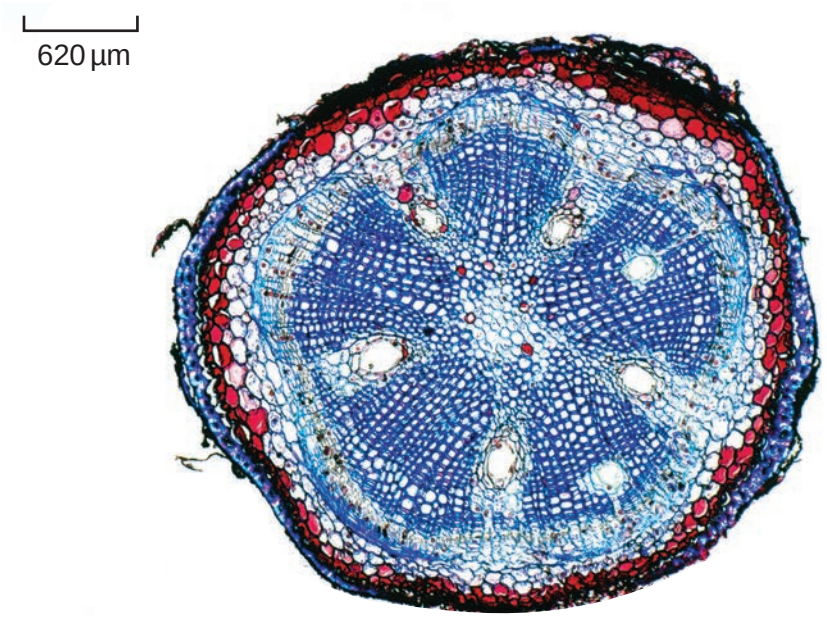


Fig. 2.2

(b) (i) Prepare the space below so that it is suitable for you to record the observable differences between the specimens in Fig. 2.1 and in Fig. 2.2.

Record your observations in the space you have prepared.

[4]

(ii) Use the scale bar to calculate the magnification of Fig. 2.2.

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

magnification × ..... [4]

(c) You are provided with a sample of banana, labelled **B**.

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Proceed as follows

1. Rub the cut end of the banana slice onto the centre of the microscope slide. Repeat until you can see an observable smear of banana tissue.

2. Add two drops of **iodine** onto the smear and carefully lower the cover slip onto the banana tissue in the smear.

3. Put the paper towel over the cover slip and gently press to separate the cells.

4. Look carefully under high power to find three cells with different shapes.

   Make a large drawing of these three cells.

   Label the cell wall and any observable internal structures of these cells.

[5]

[Total: 18]

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Copyright Acknowledgements:

Fig. 2.1 Claude Nuridsany and Marie Perennou/Science Photo Library
Fig. 2.2 J.C. Revy, ISM/Science Photo Library

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