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

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

BIOLOGY **9700/32**

Paper 3 Advanced Practical Skills **May/June 2008**

2 hours

Candidates answer on the Question Paper.

Additional Materials: As listed in the Instructions to Supervisors.

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 pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
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.

Onion	
Celery	
The length of the smallest division on the stage micrometer scale	
For Examiner's Use	
1	
2	
Total	

This document consists of **10** printed pages and **2** blank pages.

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

1 You are required to investigate the effect of different strengths of sucrose solutions on plant leaf tissue.
You are provided with two lengths of plant leaf, labelled **P1**.
You are also provided with two sucrose solutions. The first, labelled **T1**, is a 0.6 mol dm^{-3} solution of sucrose. The second labelled **X1** is a sucrose solution of unknown strength.

Using the solution **T1** and the distilled water, make up 10 cm^3 of a range of four or five solutions ranging from 0.0 to 0.6 mol dm^{-3} of sucrose into the four or five large test-tubes. Label the test-tubes and place them next to the test-tube labelled **X1**.

Tick the material being used onion ..... celery .....

INSTRUCTIONS FOR ONION

Using a scalpel or sharp blade, trim the length of the leaf to 20 mm as accurately as you can. Then cut the plant leaf into vertical strips, each 20 mm long, as shown in Fig. 1.1.

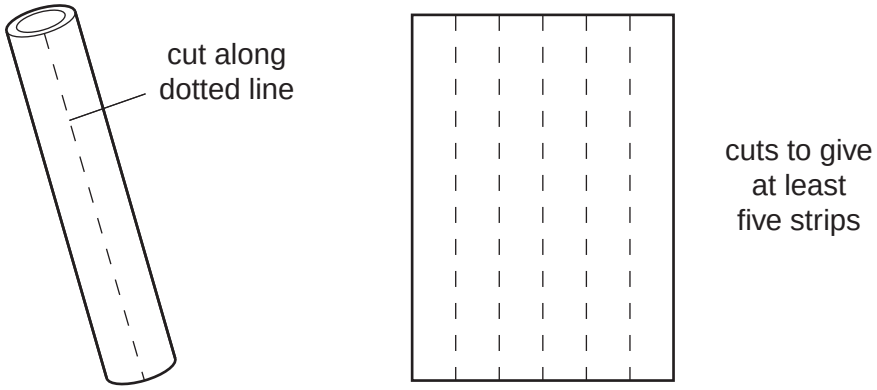

Fig. 1.1

Decide how many strips to add to each of the large test-tubes.

INSTRUCTIONS FOR CELERY

Using a scalpel or sharp knife, carefully cut off the outer layer (with ridges), in wide strips less than 5 mm thick as shown in Fig. 1.2.

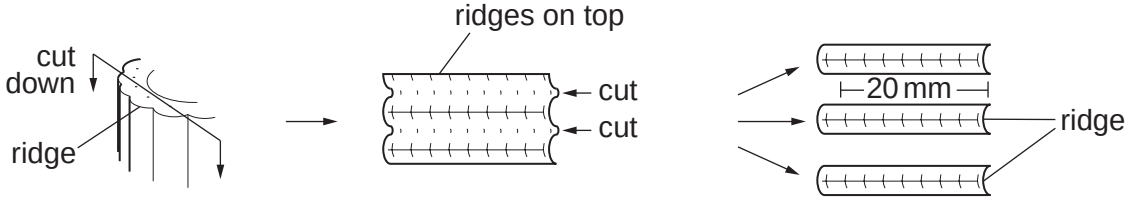

Fig. 1.2

Place the wide strip with the ridges on top on the cutting surface and cut into thin strips between the ridges as shown in Fig. 1.2. Then carefully cut to 20 mm lengths. Decide how many thin strips to add to each of the large test-tubes.

Leave for at least 20 minutes once you have added the strips to the test-tubes.

While you are waiting you may start Question 1(e).

Pour the solution and the strip(s) from one test-tube into a Petri dish.

Carefully remove a strip from the Petri dish and blot dry with a paper towel, re-measure without altering the strip and record your observations.

Repeat this procedure for each of the strips from the other test-tubes.

(a) Prepare and use the space below to record how you made up the solutions, the concentration, and the measurements you made, including **X1** and any observed changes to the strips.

[5]

(b) Estimate the concentration of sucrose solution **X1** from your observations.

.....

[1]

(c) Describe and explain the results from **all** the solutions that you made.

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.....

..... [3]

(d) **(i)** Identify **two** significant sources of error in this experiment.

1 .....

.....

2 .....

..... [2]

(ii) Suggest how you could improve this experiment.

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.....

.....

..... [3]

(e) A student investigated the effect of sucrose concentration on the diameter of red blood cells.

The original diameter of the red blood cells was 7.0 µm.

The results are shown in Table 1.1.

Table 1.1

	concentration of sucrose solution / mol dm^{-3}				
	0.05	0.10	0.20	0.40	0.80
diameter of cell 1 / µm	8.4	7.2	6.6	5.7	2.3
diameter of cell 2 / µm	7.8	7.3	6.8	5.7	2.5
diameter of cell 3 / µm	8.1	7.4	7.0	5.5	2.4
mean diameter / µm	8.1	7.3	6.8		2.4
mean change in diameter / µm	+1.1	+0.3	−0.2		−4.6

(i) Complete **Table 1.1** by calculating the missing mean diameter and mean ch… diameter for solution 0.40 mol dm^{-3}.

Write your answer in **Table 1.1**. [1]

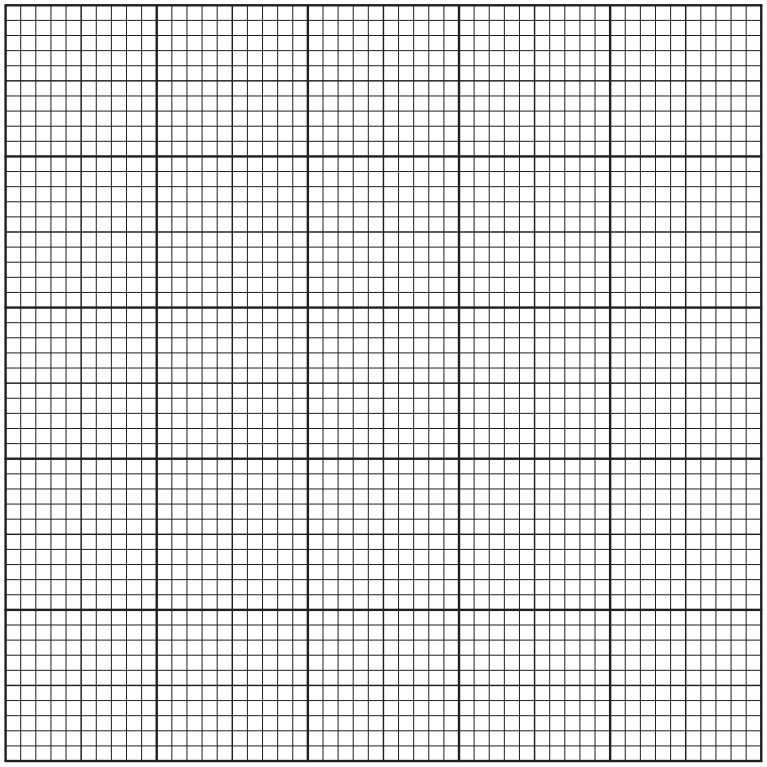
(ii) When the student first performed this investigation, the diameter of cell 2 in 0.20 mol dm^{-3} solution was 3.1 µm.

Explain why the student discarded this result and repeated the experiment with freshly made solutions.

.....

..... [1]

(iii) Plot a graph to show the effect of sucrose concentration on the mean diameter of red blood cells.



[3]

(f) The student's hypothesis was:

> The greater the concentration of sucrose solution, the greater the diameter of red blood cells.

Draw an appropriate conclusion to the student's experiment. You should include in your conclusion whether the experimental data support the hypothesis and you should produce a revised hypothesis if necessary.

.....

.....

.....

.....

..... [2]

[Total: 21]

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

You are also provided with an eyepiece graticule that has been fitted to the eyepiece of y microscope and a stage scale (stage micrometer) printed on acetate sheet.

(a) **(i)** Draw a large low-power plan diagram of a quarter of the specimen **K1** as shown in Fig. 2.1.

Labels are not required.

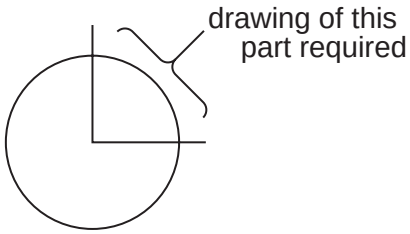


Fig. 2.1

[4]

(ii) Carefully examine one of the larger vascular bundles using the low-power microscope.

Count the number of eyepiece graticule divisions across this vascular bundle from the outer edge towards the centre (radial width).

Indicate by drawing a line on your low power plan, precisely where you made your measurement.

number of eyepiece graticule divisions .....

Remove the slide **K1** and replace it with the stage micrometer scale.

The length of the smallest division on the stage micrometer scale is ..... mm.

Using the same magnification, adjust the focus until you can see the eyepiece graticule on top of the stage micrometer scale.
Count the number of eyepiece graticule divisions that match an exact number of stage micrometer scale divisions.

number of eyepiece graticule divisions .....

number of stage micrometer scale divisions .....

Use this information to calculate the actual radial width of the vascular bundle.

Show your working.

actual radial width of the vascular bundle ..... µm [4]

(iii) Suggest how an error in measuring the vascular bundle could occur.

.....

..... [1]

(iv) In the space below, make a large high-power drawing of phloem tissue only, showing five cells that are in contact with each other. Include at least one companion cell in your drawing.

[4]

(b) **Fig. 2.2** is a photomicrograph showing a transverse section of a different stem.

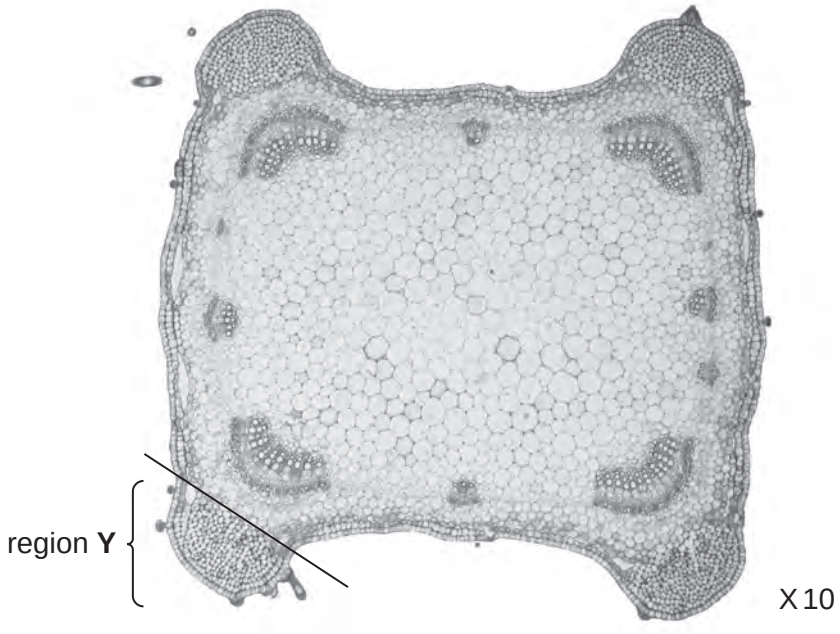


Fig. 2.2

(i) Suggest the purpose of region **Y** as shown on Fig. 2.2.

.....

..... [1]

(ii) Prepare the space below so that it is suitable for you to compare and contrast the stem on slide **K1** with the stem in **Fig. 2.2**.

Record your **observations** in the space that you have prepared.

[5]

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