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 32 Advanced Practical Skills **October/November 2008**

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 pen in the spaces provided on the Question Paper.
You may use a 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 **both** questions.
The number of marks is given in brackets [ ] at the end of each question or part question.
You are advised to spend an hour on each question.
At the end of the examination, fasten all your work securely together.

For Examiner's Use	
1	
2	
Total	

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

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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1 You are required to investigate the effects of two solutions, **T1** and **T2**, on the cells of onion epidermal tissue.

- Solution **T1** is a 1.0 mol dm^{-3} solution of potassium nitrate.
- Solution **T2** is a 1.0 mol dm^{-3} solution of lead nitrate (**toxic**).
- Beaker **W** contains distilled water.
- Beaker **O** contains distilled water and two pieces of onion.

It is very important to stop the onion from drying out.
Place a few drops of distilled water on a microscope slide.
Remove a piece of onion and using forceps or fingers peel off the inner concave epidermis as shown in Fig. 1.1. Pull the epidermis from the top of the piece towards the tip.
Immediately place the epidermis of the onion in the distilled water on the microscope slide.

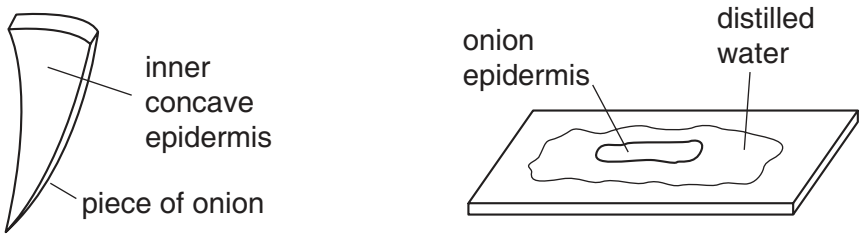

Fig. 1.1

Pour enough distilled water into the Petri dish to cover the base.
Using a scalpel carefully cut one piece of the epidermis approximately 5 mm by 5 mm and place it into the water in the Petri dish.
Repeat until you have at least 3 small square pieces of epidermis floating in the Petri dish.

Mount one of the squares of epidermis on a microscope slide in distilled water.
Cover with a cover slip and label the slide.
Repeat with two more squares of epidermis, mounting one in solution **T1** and another in solution **T2**.

(a) (i) Using low and high power, carefully examine the onion cells in the distilled water and draw and label one cell which shows the most details of its structure.

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[2]

You may need to reduce the amount of light entering the microscope by closing the iris diaphragm or reducing the light intensity.

Then look at the onion cells in **T1** and **T2** and observe as many cells as possible. Record your observations carefully.

(ii) Prepare and use the space below to present your observations from the slides made with **distilled water**, **T1** and **T2**.

[4]

(iii) Explain your observations from the slides made with **distilled water**, **T1** and **T2**.

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..... [3]

(iv) Identify **two** significant sources of error in the experiment.

1. .....

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2. .....

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[2]

(b) Suggest how you could modify this experiment to investigate more fully the effect of lead nitrate.

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..... [3]

(c) In a similar investigation involving a range of sodium chloride concentrations, a student obtained the results shown in Table 1.1.

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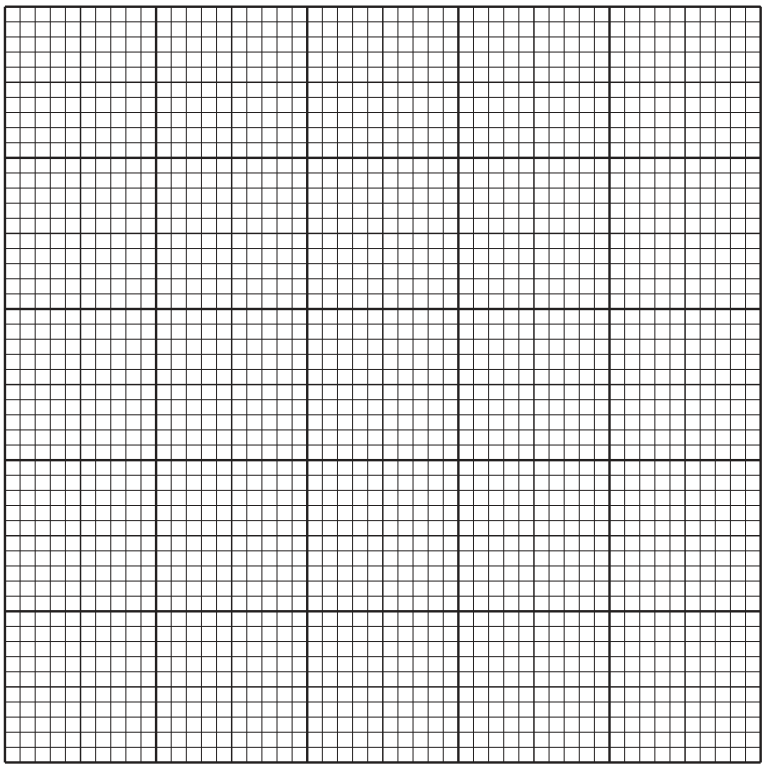
Table 1.1

	percentage plasmolysis of cells				
sodium chloride concentration / mol dm^{-3}	batch 1	batch 2	batch 3	batch 4	mean
0	0	0	0	0	0
0.2	2	4	1	1	2
0.4	5	77	7	5	
0.6	27	25	30	28	27
0.8	76	82	84	35	
1.0	99	100	98	100	99

(i) Complete Table 1.1 by calculating the missing values taking into account any anomalous values. [1]

(ii) Plot a graph of concentration of the sodium chloride solution against the percentage plasmolysis of the cells.



[3]

(iii) State the concentration at which there is 50% plasmolysis of the cells represented in Table 1.1 and your graph on Page 5.

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..... [1]

(d) The student's hypothesis was:

The more concentrated the solution the more plasmolysed the cells become.

Draw an appropriate conclusion to the student's experiment.

You should include in your conclusion whether the experimental data support the hypothesis and produce a revised hypothesis if necessary.

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..... [2]

[Total : 21]

2 Fig. 2.1 is a photomicrograph of a transverse section of a tubular structure from an animal.

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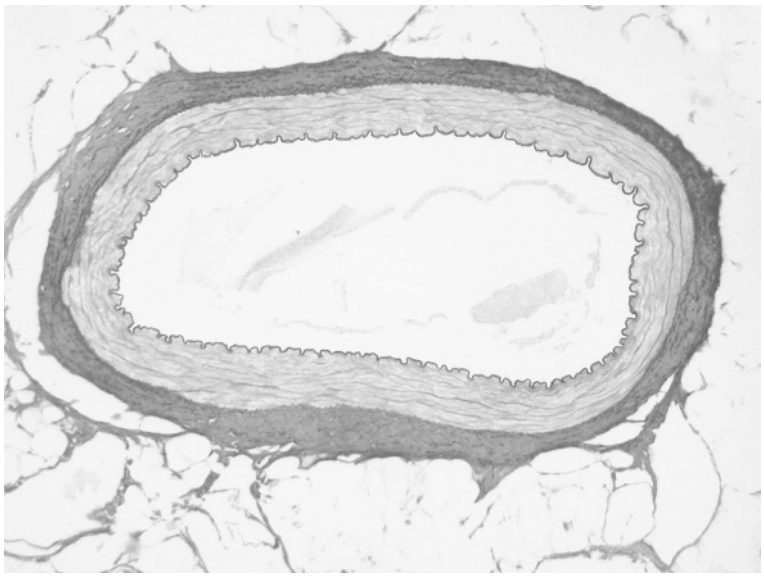

Fig. 2.1

(a) (i) Draw a large low-power plan diagram of the specimen in photomicrograph Fig. 2.1.

[4]

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(ii) **Fig. 2.2** shows the same specimen as **Fig. 2.1** but it is a longitudinal section. It includes the image of an eyepiece graticule.

Fig. 2.3 shows a photomicrograph of a stage micrometer scale using the same lenses as **Fig. 2.2** and includes an image of the same eye piece graticule.

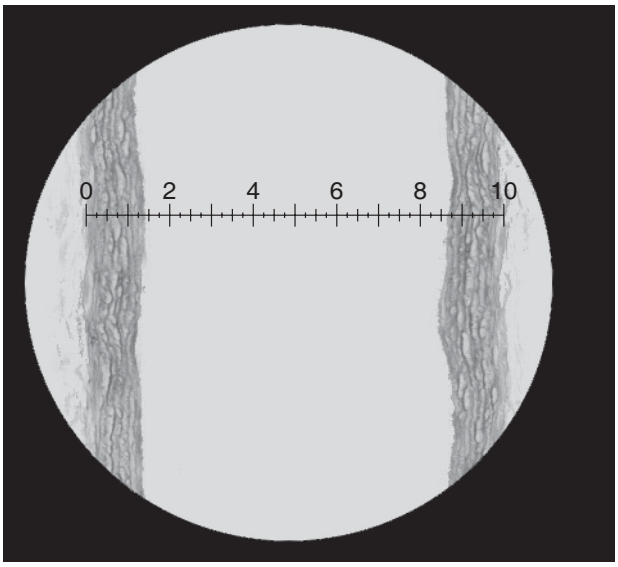

Fig. 2.2

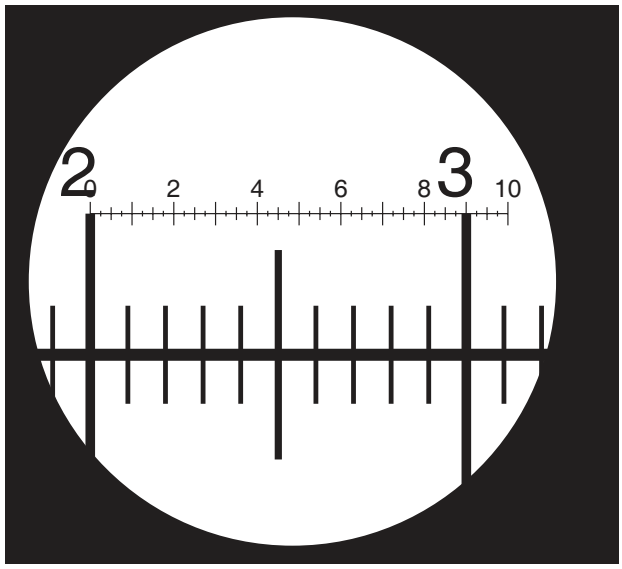

Fig. 2.3

Each division on the stage scale is 0.1 mm

Count the number of eyepiece graticule units across the lumen of the structure on Fig. 2.2.

number of eyepiece graticule units .....

Count the number of eyepiece graticule units that match an exact number of stage micrometer scale divisions.

number of eyepiece graticule units .....

number of stage micrometer scale divisions .....

Use this information to calculate the actual width of the lumen in Fig. 2.2.

Show your working.

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actual width of the lumen on Fig. 2.2 ..... [4]

(iii) Suggest how an error in measuring the width of the lumen could occur.

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..... [1]

(b) The whole specimen in **Fig. 2.2** is repeated below without the graticule scale as **Fig. 2.4**.

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Fig. 2.5 shows a longitudinal section of a specimen from a different type of organism. **Fig. 2.4** and **Fig. 2.5** are **not** reproduced at the same scale.

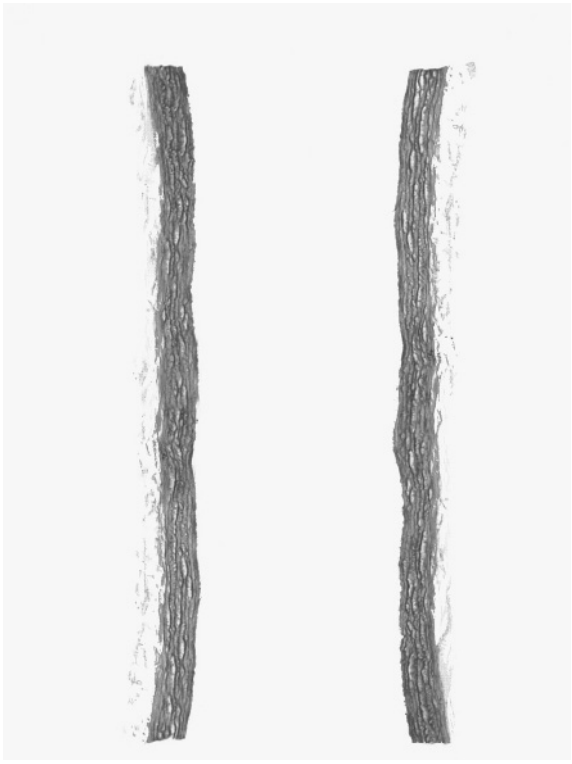

Fig. 2.4

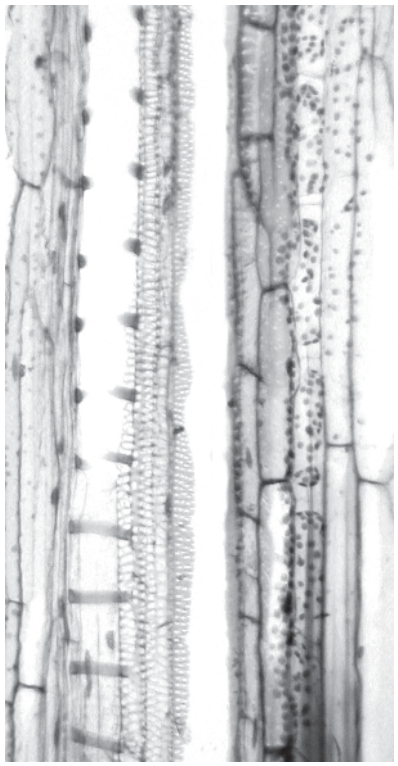

Fig. 2.5

(i) Prepare the space below so that it is suitable for you to compare and contrast the specimens in Fig. 2.4 and Fig. 2.5 and then record your observations.

[5]

(ii) Suggest **one** feature which indicates that the specimen in Fig. 2.5 is a plant.

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(iii) Draw **five** representative cells from Fig. 2.5 that show the diversity of cell shape and size. Please mark on Fig. 2.5 the cells that you have drawn.

[4]

[Total : 19]

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