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

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

7513769989

BIOLOGY **9700/35**

Advanced Practical Skills 1 **May/June 2012**

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.

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.

For Examiner's Use

You should:

- Read carefully through **the whole** of Question 1 and Question 2.
- 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 cells are placed into different concentrations of sodium chloride solution, water moves between the cells and the solutions. This will affect how much a piece of plant tissue can bend.

Fig. 1.1 shows how the angle of bend of a sample of plant tissue can be measured after you have pushed it until it will bend no further without breaking.

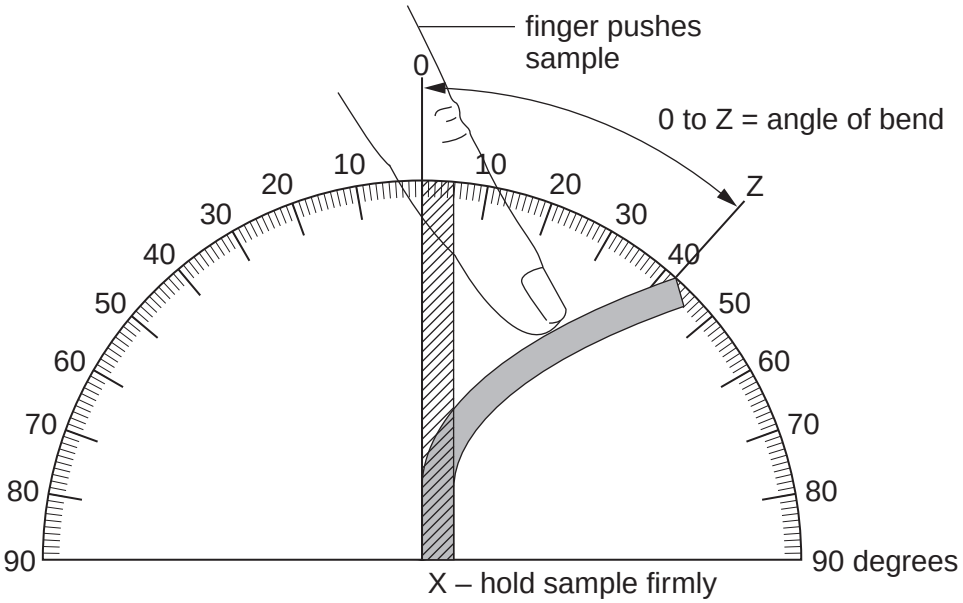

Fig. 1.1

You are provided with eight pieces of plant tissue, each soaked in a different concentration of sodium chloride solution labelled **P1**, **P2**, **P3** and **P4**.

P1, **P2** and **P3** each contain one of the concentrations of sodium chloride solution, 1.00 mol dm^{-3}, 0.50 mol dm^{-3} and 0.25 mol dm^{-3} but not necessarily in that order.

P4 has an unknown concentration of sodium chloride solution.

(a) (i) When samples of the plant tissue from each of the concentrations of sodium chloride solution are put into water, water will move.
Select the correct words from "**least**", "**most**", "**same**" to complete the sentence below.
You may use a word once, more than once or not at all.

The sample of plant tissue soaked in the highest concentration of sodium chloride solution will have the ..... bend at the start and when placed in water the bend will change the ..... . [1]

You are required to:

- Observe and record the effect of putting samples of plant tissue from **P1**, **P2**, **P3** and **P4** into water, **W**, for different times up to 10 minutes.
- Use these results to answer **(b)(ii)** concerning the concentrations of the sodium chloride solutions, **P1**, **P2**, **P3** and **P4**.

The size of plant tissue is a variable which needs to be considered. Each piece of plant tissue should be a standard size.

(ii) Decide how you will make sure that the pieces of plant tissue are standard size.

State the size you will use.

.....

..... [1]

(iii) Describe how you will obtain accurate results to record the angle of bend of the plant samples.

..... [1]

You are advised to read steps 1 to 5 before proceeding.

(iv) To observe the effect of putting samples of plant tissue from **P1**, **P2**, **P3** and **P4** into **W** for different times up to 10 minutes you need to decide the times you will use.

State the times at which you will measure the angle of bend.

..... [1]

Proceed as follows:

1. Cut the pieces of plant tissue as stated in **(a)(ii)**.
2. Measure the angle of bend of the samples of plant tissue from **P1**, **P2**, **P3** and **P4** as shown in Fig. 1.1. Record your results in **(b)(i)**.
3. Put the samples from **P1**, **P2**, **P3** and **P4** into separate containers and add **W** to each container so that the samples are covered.
4. Start timing.
5. Measure the samples at each of the times that you decided in **(a)(iv)**.

(b) (i) Prepare the space below and record your results.

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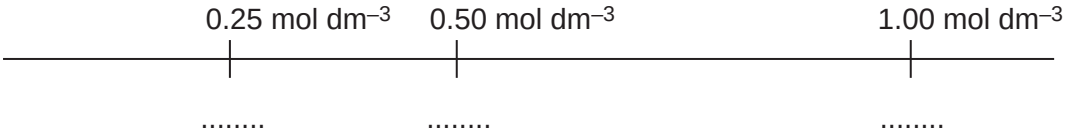
[7]

(ii) Use your results in **(b)(i)** to identify the concentrations of the sodium chloride solutions.

Complete the diagram below to show the position of each of the concentrations **P1**, **P2** and **P3**. Write "**P4**" where it fits in the series of sodium chloride concentrations.



[2]

(iii) Explain the effect of putting the plant tissue from **P1** into water, **W**.

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.....[1]

(iv) Identify **two** significant errors in this investigation.

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.....[2]

(v) A protractor was used to measure the angle of bend.

State the value of the smallest division on the protractor. .....

State the actual error in using the protractor to measure the angle of bend.

.....[1]

(vi) Suggest how you would make this investigation as reliable as possible.

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.....[3]

[Total: 20]

2 Iodine solution and methylene blue solution are used as stains for biological material.

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You are required to:

- observe the effect of using the different stains, iodine solution and methylene blue solution, on thin sections of plant material, **S**
- record observations of the cells and their cell contents.

Iodine solution and methylene blue solution will stain your skin. Handle the stained plant material with forceps.

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

1. Label two microscope slides, **S1** and **S2**.

2. Put **one or two drops** of iodine solution onto slide **S1** and **one or two drops** of methylene blue solution onto slide **S2**.

3. Cut two very thin sections of the plant material, **S**.

4. Put a thin section onto the drops of stain on each slide as shown in Fig. 2.1.

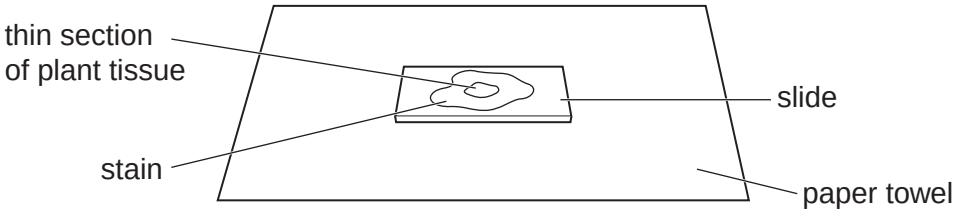

Fig. 2.1

5. Put a few more drops of iodine solution onto the plant section on **S1** and put a few more drops of methylene blue solution onto the plant section on **S2**. Make sure the iodine solution and the methylene blue solution cover each of the sections.

6. Place a coverslip onto each slide. The coverslip may not lie flat.

7. Use the paper towel to dry off any excess liquid around the coverslip.

8. View the slides using the microscope. Look for the thinnest part of the section, which may be at the edge, so that the cells and their contents can be observed.

(a) From each slide **S1** and **S2**, make large labelled drawings of two adjacent (touching) cells and their cell contents.

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Label one starch grain.

Annotate your drawings to describe one observable difference between **S1** and **S2**.

[6]

Fig. 2.2 is a photomicrograph of a transverse section through the vascular tissue of a leaf. This plant is native to the Himalayan mountains.

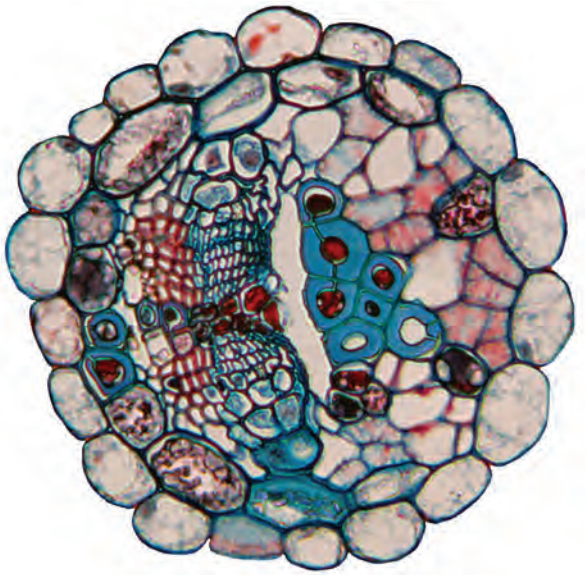

Fig. 2.2

(b) (i) Draw a large plan diagram of the tissues in the section shown in Fig. 2.2.

Label the xylem.

[6]

(ii) In Fig. 2.2 there is an outer ring of cells.

Calculate the ratio of the mean length of these cells to the mean width of these cells.

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

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[2]

Question 2 continues on page 10

In an investigation the concentration of sugars in a plant were measured over 24 hours. For the first eight hours, the plant was in the dark, then it was placed in the light for the remaining 16 hours.

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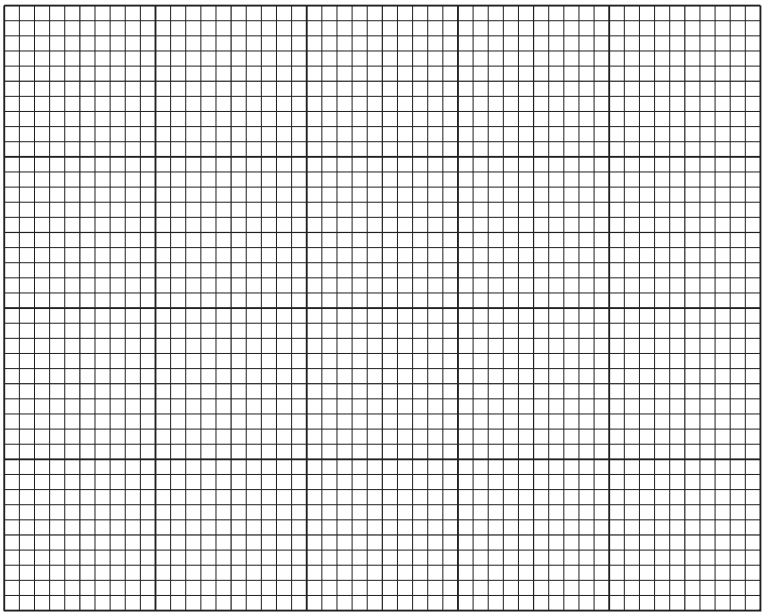
The concentrations of sugars were measured in samples taken from leaves and from phloem sieve tubes.

Table 2.1 shows the results of this investigation.

Table 2.1

time / hours	concentration of sugars / μmol	
	in leaves	in phloem sieve tubes
0	0.38	0.22
5	0.21	0.17
8	0.12	0.12
15	0.24	0.16
24	0.39	0.22

(c) (i) Plot a graph of the data shown in Table 2.1.



[4]

(ii) Describe the trend for the concentration of sugars in the phloem. Suggest an explanation for the trend.

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.....[2]

[Total: 20]

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