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

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7625209005

BIOLOGY **9700/35**

Advanced Practical Skills 1 **October/November 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 Question 1 and Question 2.
- Plan your use of **the time** to make sure that you finish all of the work that you would like to do.

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

1 Enzyme **E** catalyses the hydrolysis of sucrose to the reducing sugars, glucose and fructose.

Glucose and fructose can diffuse through a partially permeable (selectively-permeable) membrane.

The wall of Visking (dialysis) tubing is partially permeable.

A bag made of Visking tubing, containing enzyme **E** and sucrose solution, is placed into a large test-tube containing distilled water. The large test-tube is placed in a water-bath.

You are required to follow the time course of this enzyme-catalysed reaction by testing the distilled water surrounding the bag.

Samples of water around the bag are taken at intervals during 20 minutes and tested for reducing sugars using Benedict's solution.

You are provided with:

labelled	**contents**	**hazard**	**volume / cm^3**
E	invertase solution	irritant	15
S	sucrose solution	none	15
Benedict's solution	Benedict's solution	harmful irritant	60
W	distilled water	none	200

You are also provided with:

- **V**, one length of Visking (dialysis) tubing in distilled water.

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You will need to run the time course for the enzyme-catalysed reaction for 20 minutes.

Fig. 1.1 shows the procedure for investigating the time course of the enzyme-catalysed reaction. The times you will use are 5 minutes, 10 minutes, 15 minutes and 20 minutes.

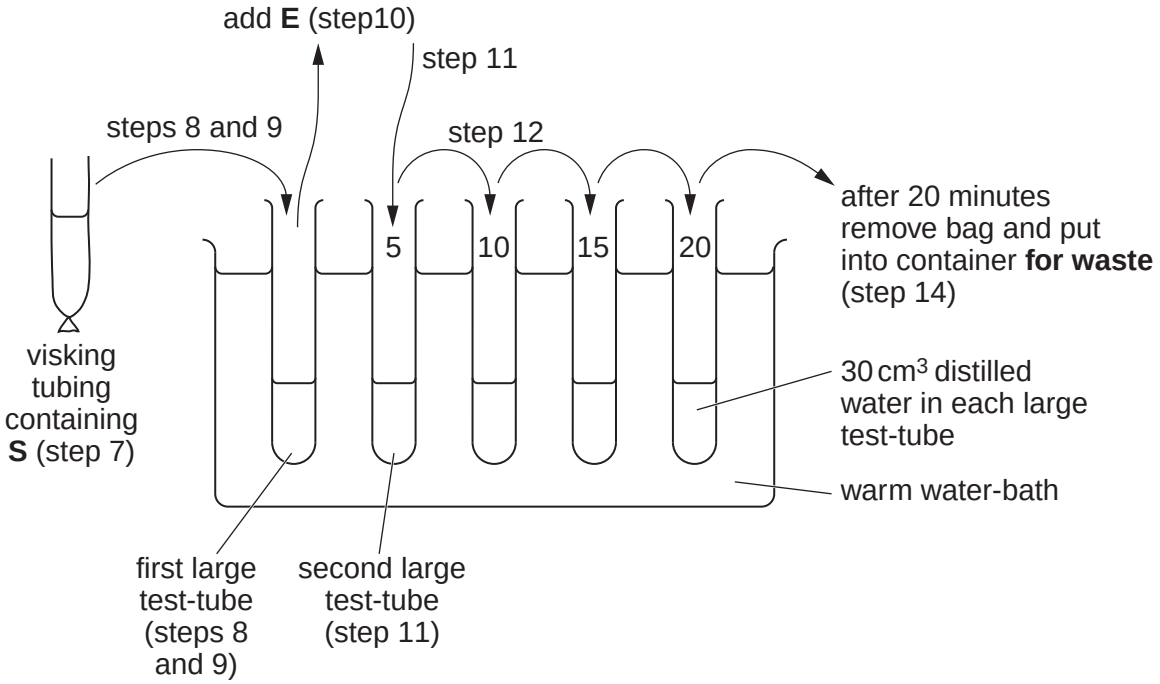


Fig. 1.1

You are advised to read steps 1 to 19 before proceeding.

Proceed as follows:

1. Label the large test-tubes with the times and put 30 cm^3 of distilled water into each one.

2. While you are doing steps 3 to 16 you will need to heat up the beaker of water labelled **for Benedict's test** so that it can be used later to carry out the Benedict's test.

   Decide on the temperature you plan to use for this water-bath.

   (i) State the temperature you have chosen in the space below.

   ..... °C [1]

3. Prepare a water-bath between 35 °C and 40 °C using the beaker of water labelled **for reaction**.

4. Put all the labelled large test-tubes into the water-bath labelled **for reaction**.

5. Tie a knot in the Visking tubing as close as possible to one end so that it seals the end forming a bag.

6. To open the other end, wet the Visking tubing and rub the tubing gently between your fingers.

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7. Put 4 cm^3 of **S** into the open end of the bag.

8. Put the bag into the water in the first large unlabelled test-tube.

9. Allow 3 minutes for **S** in the bag to reach the same temperature as the distilled water surrounding the bag.

10. Put 4 cm^3 of enzyme **E** into the bag. You need to mix the enzyme with the substrate. Remove the bag, close the open end between your fingers. Holding both ends tightly, turn the bag upside down several times and this will mix the contents.

11. Put the bag back into the second large test-tube, labelled 5. Start timing the time course.

12. After 5 minutes remove the bag and contents and place it into the next large test-tube.

13. Repeat step 12 as shown in Fig. 1.1.

14. After 20 minutes, put your bag with its contents into the container labelled **for waste**.

15. At the end of the 20 minutes put the contents of each large test-tube into separate labelled small containers.

16. Test the contents of the small containers for reducing sugars using Benedict's solution. You will need to keep the volume of Benedict's solution the same for each test.

    Decide on the volume of sampling solution and Benedict's solution you plan to use for each test.

(ii) State the volume of sampling solution and Benedict's solution you have chosen.

volume of sampling solution .....

volume of Benedict's solution .....

[2]

17. In the small test-tubes, add the volumes of samples and Benedict's given in **(ii)**.

18. Put all the test-tubes into the water-bath **for Benedict's test** and immediately start timing.

19. Record the time for the change from blue to the first colour you see (ignore any further colour changes). If there is no colour change at 10 minutes, record "more than 600".

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

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[4]

(iv) Identify **one** significant source of error in this investigation.

.....

..... [1]

(v) Describe a suitable control for this investigation.

.....

..... [1]

(vi) Suggest how you would make **two** improvements to this investigation.

.....

.....

.....

.....

..... [2]

A student investigated the effect of placing pieces of tissue from a potato in sucrose solutions of different concentrations.
At the start, each sample of potato tissue was weighed and the initial mass was recorded.
Then each sample of potato tissue was placed into a different concentration of sucrose solution.
After a set time the potato tissue was removed and the final mass of the potato tissue was recorded.
The change in mass and percentage change of mass for each sample of potato tissue was calculated.
The results of the student's investigation are shown in Table 1.1.

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Table 1.1

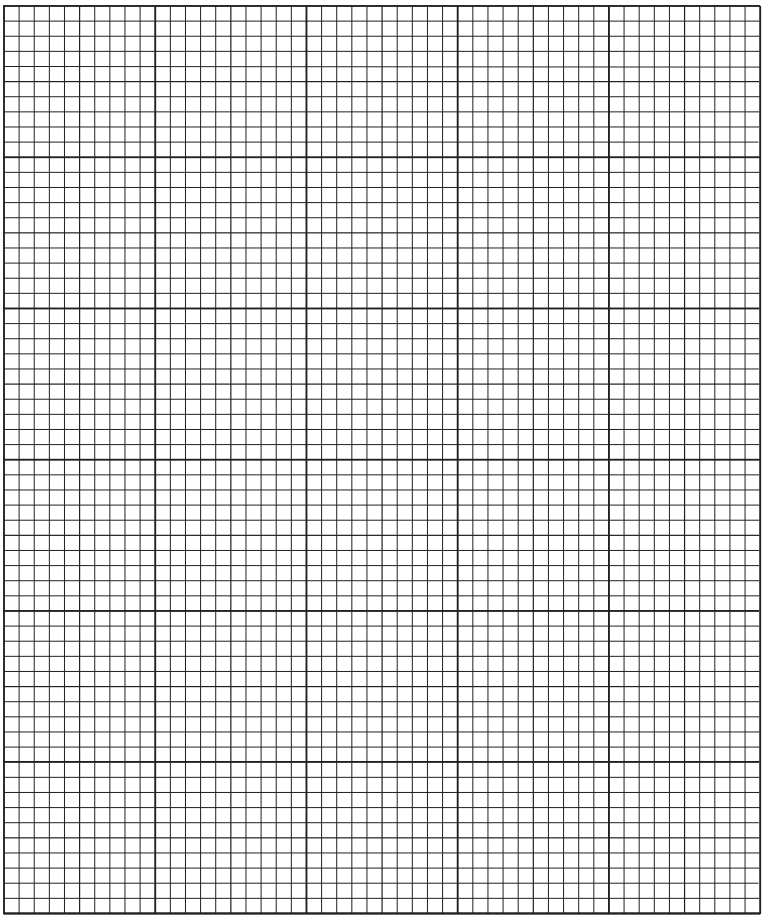
sucrose concentration / mol dm^{-3}	initial mass / g	final mass / g	change in mass / g	percentage change in mass
0.0	2.54	3.18	0.64	25.0
0.2	2.43	2.62	0.19	
0.4	2.40	2.45	0.05	2.0
0.6	2.71	2.30	−0.41	−15.0
0.8	2.44	2.49	0.05	2.0
1.0	2.58	1.80	−0.78	−30.0

(b) (i) Complete Table 1.1. [1]

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

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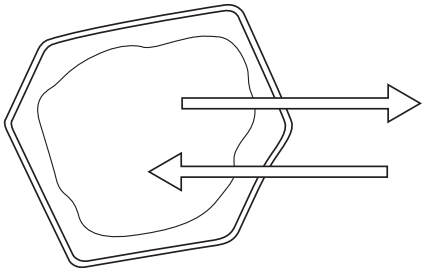
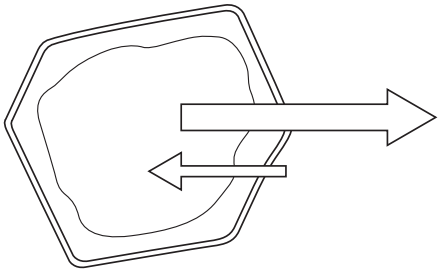
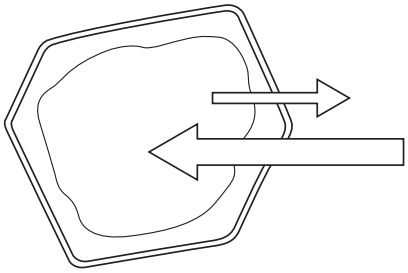
[4]

(iii) Draw a circle around the anomalous result on the graph. [1]

(iv) Complete Table 1.2 below.

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Table 1.2

diagrams of potato cells with arrows showing the direction and quantity of water movement	from your graph, state one example of a sucrose concentration where this water movement occurs **and** explain how you chose this example
Cell **A** 	example ..... explanation ....
Cell **B** 	example ..... explanation ....
Cell **C** 	example ..... explanation ....

[3]

(v) Explain, in terms of water potential, the movement of water in cell **A**.

.....

.....

.....

.....

.....

..... [2]

[Total: 22]

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2 **L1** is a slide of a stained transverse section through a plant leaf.
The plant belongs to a genus which grows widely especially in Chile and Argentina.

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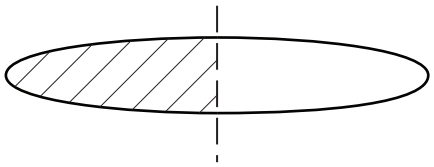


Fig. 2.1

(a) **(i)** Draw a large plan diagram of the part of the leaf indicated by the shaded area in Fig. 2.1.

Label the palisade mesophyll and the epidermis.

[6]

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[Turn over

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(ii) Between the vascular bundles are openings (canals) surrounded by a wall of cells.

Make a large drawing of six adjacent (touching) cells making up this wall of cells (the inner wall of the canal).

Label with the letter **F** a stained feature inside one cell.

[6]

(iii) State one observable feature of the epidermis that supports the conclusion that this is a leaf from a plant growing in a dry habitat.

Suggest how this feature helps the plant to survive in a dry habitat.

.....

.....

..... [1]

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Fig. 2.2 is a photomicrograph of a transverse section through a leaf of a different plant species. This plant is native to Europe, North Africa and Asia but grows widely throughout the world.

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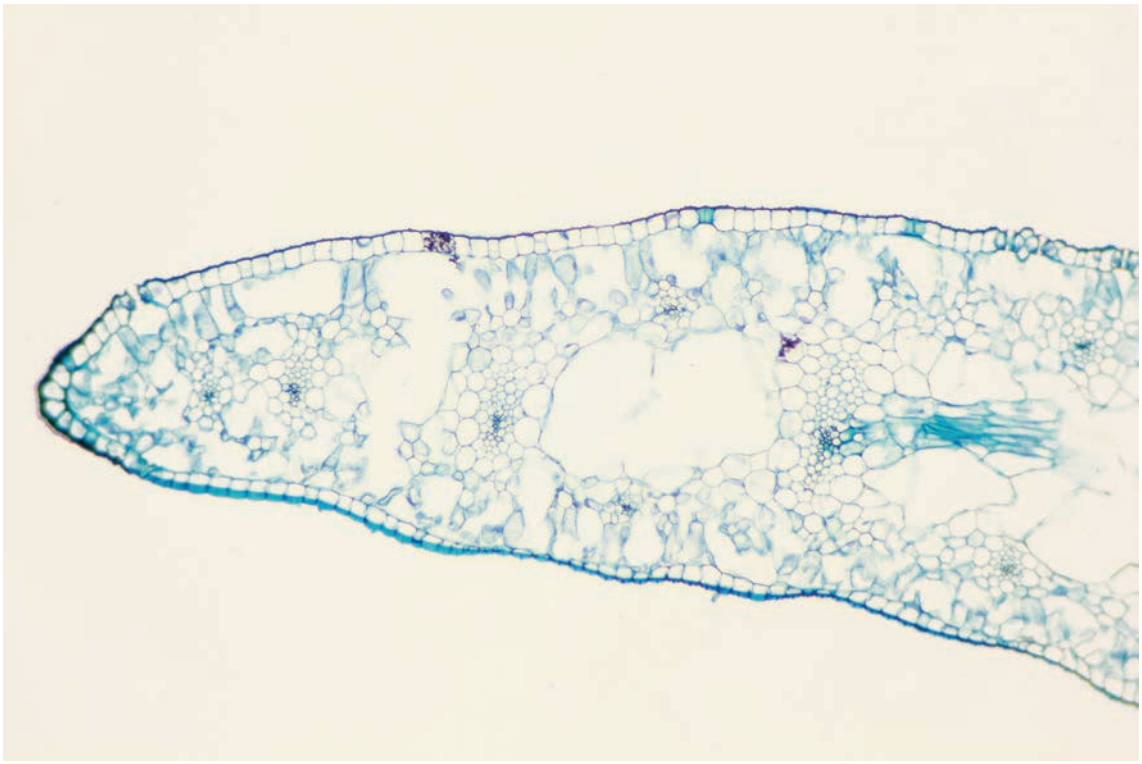


Fig. 2.2

(b) Prepare the space below so that it is suitable for you to record **three** observable differences between the specimen on **L1** and in Fig. 2.2.

Record your observations in the space you have prepared.

[5]

[Total: 18]

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