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

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

0011455449

BIOLOGY **9700/36**

Advanced Practical Skills 2 **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 **both** 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 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 glucose and fructose.

By adding enzyme **E** to different concentrations of sucrose the reducing sugars, glucose and fructose, will be formed. After a set time, the presence of reducing sugars can be determined by using Benedict's solution.

The end-point of this investigation is the time taken for the reducing sugars to change the colour of Benedict's solution from blue to the first colour you see (ignore any further colour changes).

You are required to find the sucrose concentration of a sample, **U**, by using the results of Benedict's tests on the reaction of enzyme **E** on different concentrations of sucrose.

You are provided with:

labelled	**contents**	**hazard**	**percentage concentration**	**volume / cm^3**
E	invertase solution	irritant	–	25
S	sucrose solution for serial dilution	none	10	25
U	sucrose solution	none	unknown	10
Benedict's solution	Benedict's solution	harmful irritant	–	60
W	distilled water	none	–	150

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

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

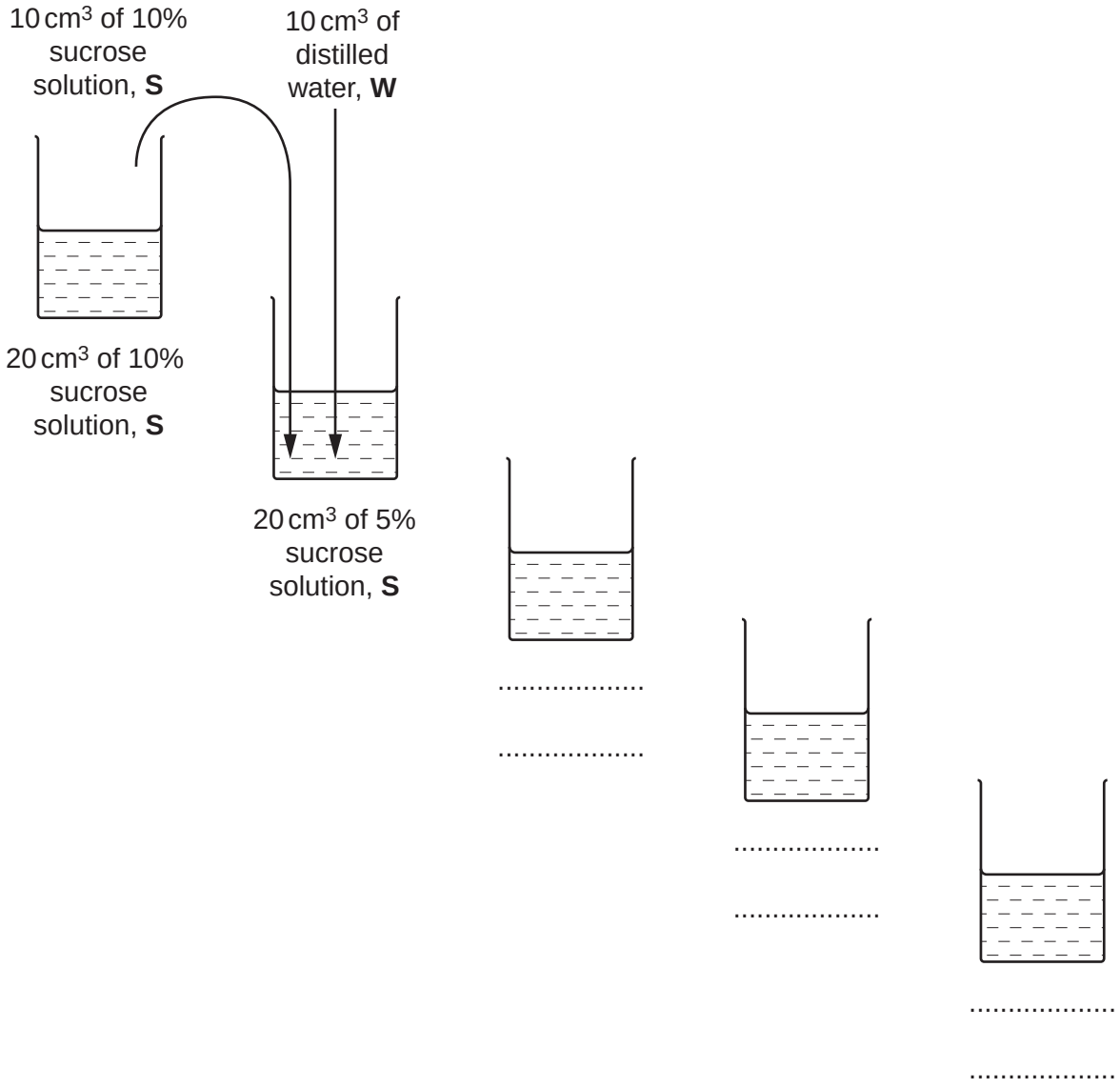


Fig. 1.1

(a) (i) Complete Fig. 1.1 to show how you will make **three** further concentrations of sucrose solution, **S**. [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]

You are advised to read steps 1 to 11 before proceeding.

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Proceed as follows:

1. Prepare the concentrations of sucrose solution as shown in Fig. 1.1, in the containers provided.

2. While you are doing steps 3 to 7 you will need to be heating up the water in the beaker labelled **for Benedict's test** to a temperature of more than 80 °C.

3. Put 2 cm^3 of the 10% sucrose solution, **S** into a labelled test-tube.

4. Put 2 cm^3 of **E** into the same test-tube.

5. Repeat steps 3 and 4 with each of the concentrations of sucrose and **U**.

6. Set up your control.

7. Put all the test-tubes into the water-bath labelled **for reaction**, between 35 °C and 40 °C, for 8 minutes.

8. After the test-tubes have been in the water-bath for 8 minutes, remove the test-tubes.

9. Put 4 cm^3 of Benedict's solution into each test-tube.

10. Put all the test-tubes into the water-bath at more than 80 °C and immediately start timing.

11. 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 after 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) Using your results, complete the following statement.

The concentration of the unknown sucrose sample, **U**, is between .....% sucrose solution and .....% sucrose solution. [1]

(v) Suggest how you would modify this investigation to obtain a more accurate estimate of the sucrose concentration in sample **U**.

.....

.....

.....

.....

.....[2]

Peas are preserved by storing them in a freezer at low temperatures.
However, during storage peas lose some of their Vitamin C content.
The effect of temperature, on Vitamin C content, was investigated in peas at two temperatures, –12 °C and –6 °C.
The Vitamin C content of peas was measured before being placed in cold storage and then at 20 day intervals.

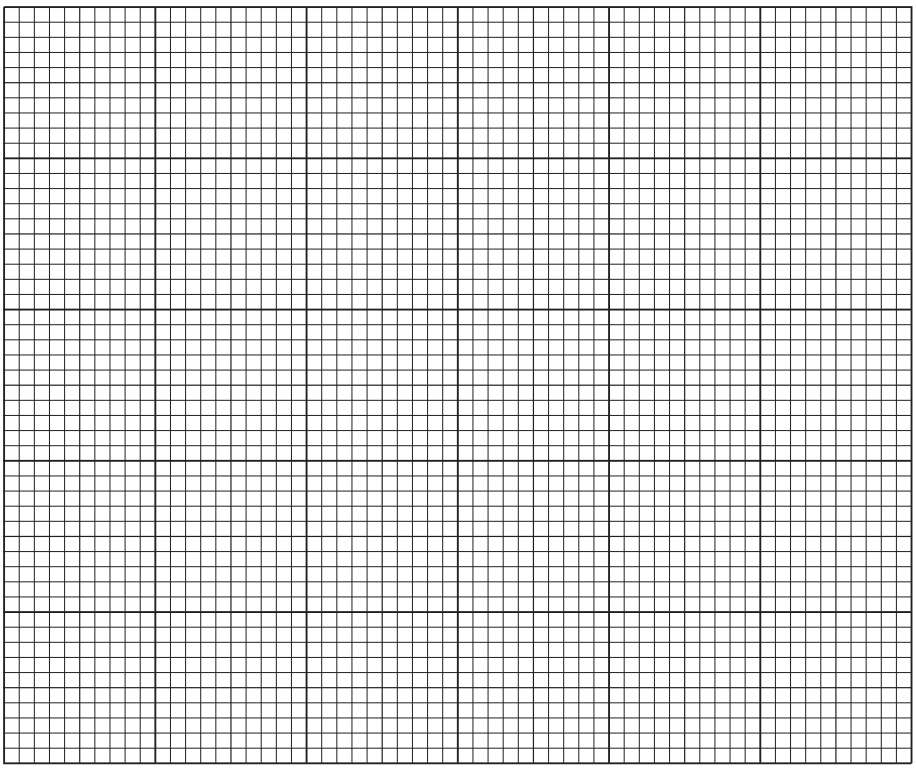
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The results are shown in Table 1.1.

Table 1.1

storage / days	percentage of Vitamin C content at –12 °C	percentage of Vitamin C content at –6 °C
0 (before freezing)	100	100
20	95	64
40	89	43
60	86	13

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



[4]

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(ii) A hypothesis was suggested that:

Peas stored for 60 days at 10°C would contain no vitamin C.

State whether you support this hypothesis and use the results to explain the reasons for your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....[2]

(iii) Find the difference in Vitamin C content of peas at 26 days stored at the two different temperatures.

Show on your graph where you obtained the data.

.....% [2]

[Total: 19]

2 **N1** is a slide of a stained transverse section through a plant stem.

This plant genus is found in Africa, Asia, Australasia, Europe and North America.

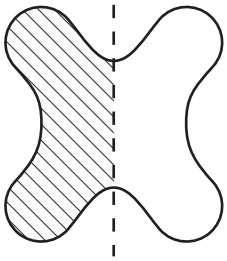


Fig. 2.1

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

Label the xylem.

[6]

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Hair-like structures called trichomes are attached to the epidermal cells.

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Choose a whole trichome and its attached epidermal cells which can be clearly observed.

(ii) Make a large drawing of a whole trichome and five epidermal cells at the base of the trichome.

Label the trichome and one epidermal cell.

[6]

(iii) Suggest a possible function for the trichome on this stem.

.....[1]

Fig. 2.2 is a photomicrograph of a transverse section through a stem of a different plant species. This plant genus is found in Europe, Middle East and North Africa.

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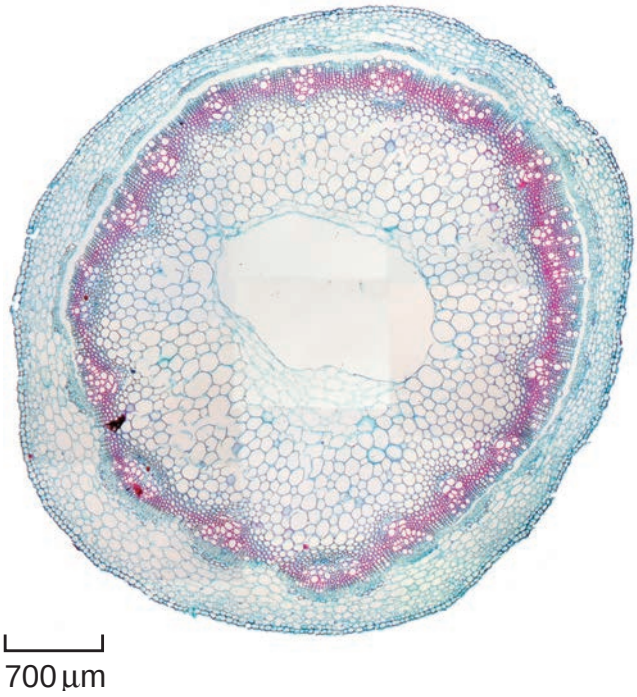


Fig. 2.2

(b) (i) Using the scale bar calculate the magnification of Fig. 2.2.

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

magnification x ..... [3]

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(ii) Prepare the space below so that it is suitable for you to record **three** observable differences between the specimens on **N1** and in Fig. 2.2.

Record the observations in the space you have prepared.

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[5]

[Total: 21]

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