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

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **9700/34**

Advanced Practical Skills 2 **October/November 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.

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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 The enzyme, **E**, hydrolyses (breaks down) the protein in milk.

After the enzyme and milk are mixed, the protein is hydrolysed and the mixture will change from cloudy to clear. The end-point is reached when the mixture is clear.

You are required to:

- make different concentrations of the enzyme solution, **E**
- investigate the effect of different concentrations of **E**, by finding the time taken to reach the end-point.

You are provided with:

labelled	contents	hazard	volume / cm^3
E	1.0 % enzyme solution	irritant	20
W	distilled water	none	50
S	milk	none	50

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(a) (i) You will need to make dilutions of the 1.0% solution of **E**, so that the concentration of **E** is reduced by 0.2% between each successive dilution.

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You will need 5 cm^3 of each concentration.

Prepare the space below to show the:

- concentrations of **E**
- volumes of **E**
- volumes of distilled water, **W**.

[3]

(ii) Decide on a control you will use.

Describe how you will set up a control using the apparatus provided.

.....

..... [1]

Proceed as follows:

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1. Prepare the concentrations of **E** and the control as decided in **(a) (i)** and **(ii)**.
2. Set up a water-bath and adjust the temperature to between 35 °C and 40 °C. Maintain the temperature of the water-bath.
3. Put 1 cm^3 of the lowest concentration of **E** into a test-tube and put the test-tube into the water-bath.
4. Repeat step 3 for all the concentrations of **E** and the control prepared in step 1.
5. Leave the test-tubes for 2 minutes.
6. Remove the test-tubes containing the three highest concentrations of **E**.
7. Put 3 cm^3 of **S** into each test-tube and mix well.
8. Record the time taken for each test-tube to reach the end-point. If the end-point is not reached by 240 seconds, record 'more than 240'.
9. Repeat steps 6 to 8 with the remaining test-tubes in the water-bath.

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

[5]

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(iv) Identify a significant source of error in your investigation.

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..... [1]

(v) Suggest how you would modify this investigation to find the effect of pH on the **rate** of hydrolysis of the protein in milk.

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..... [3]

Gelatine is made up of protein which is hydrolysed by the enzyme protease.

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A student investigated the effect of pH 4.0 and pH 6.4 on the activity of protease.

One piece of gelatine, with an area of 200 mm^2, was placed in a Petri dish and covered with a solution of protease maintained at pH 4.0.

The area of gelatine was recorded at intervals for 90 minutes.

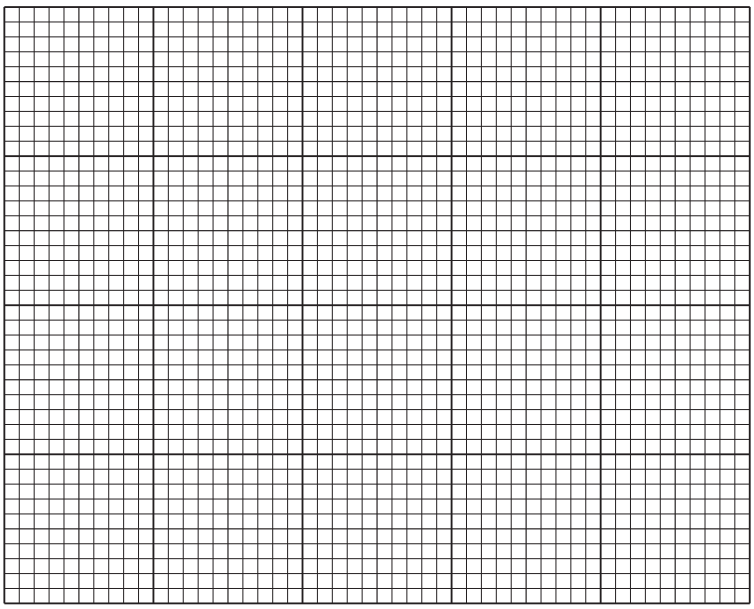
The investigation was repeated with another piece of gelatine and a solution of protease maintained at pH 6.4.

The results of the student's investigation are shown in Table 1.1.

Table 1.1

time / minutes	**area of gelatine / mm^2**	
	pH 4.0	**pH 6.4**
0	200	200
30	165	190
45	105	185
60	50	145
90	0	100

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



[4]

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(ii) Describe the trends shown by the data.

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.....[2]

(iii) Explain the difference in the effect of pH 4.0 and pH 6.4 on the activity of protease.

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.....[3]

[Total: 22]

2 **M1** is a slide of a transverse section of a leaf. The plant is native to the Himalayas.

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(a) **(i)** Draw a large plan diagram of the whole section of the leaf on **M1**.

On your diagram, use a label line and label to show the xylem.

[5]

(ii) Choose one group of three touching palisade cells which have different shapes and make a large drawing of the group.

On your drawing, use a label line and label to show a chloroplast.

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[5]

Fig. 2.1 is a photomicrograph of a transverse section of a different type of leaf from the same plant.

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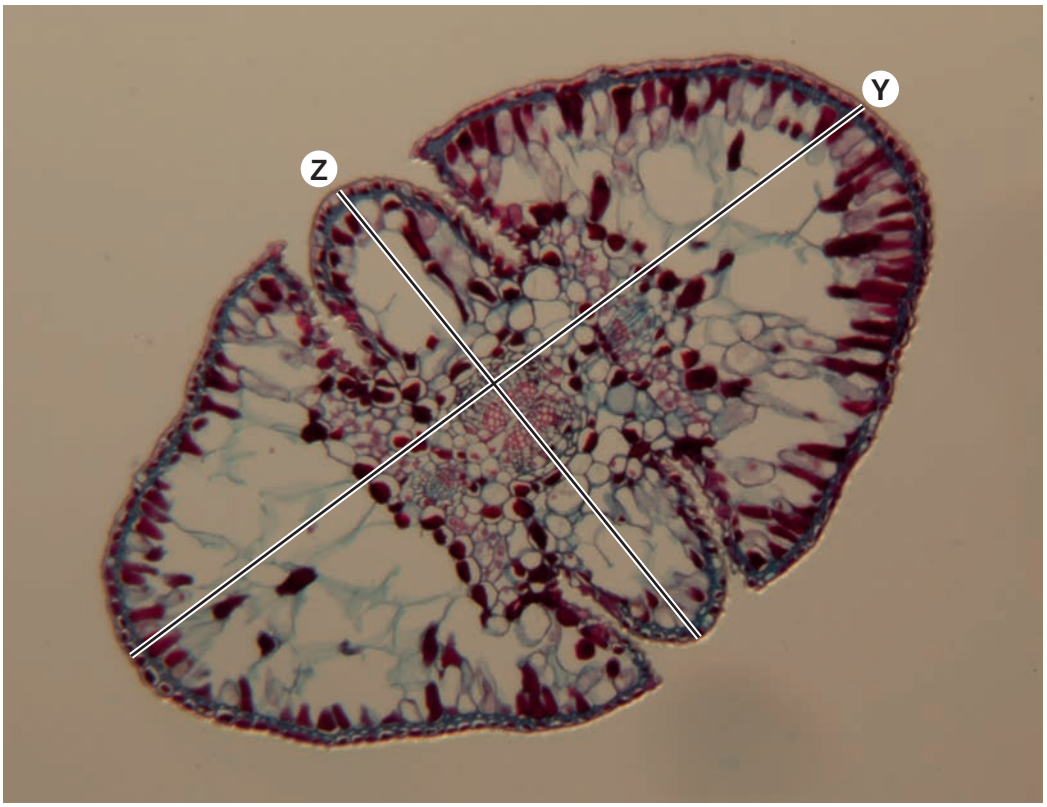


Fig. 2.1

(b) Use the lines **Y** and **Z** shown on Fig. 2.1, to calculate the ratio of **Y** to **Z**.

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[3]

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(c) (i) Fig. 2.2 shows the outline of a plan diagram of the specimen shown in Fig. 2.1. Within this outline, complete the plan diagram of the specimen. [2]

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(ii) You are required to annotate Fig. 2.2 to describe three observable differences between Fig. 2.1 and **M1**.

Draw label lines to three different features and use only the labels, **P**, **Q** and **R**.

Next to each letter, describe how each feature on Fig. 2.1 differs from **M1**. [3]

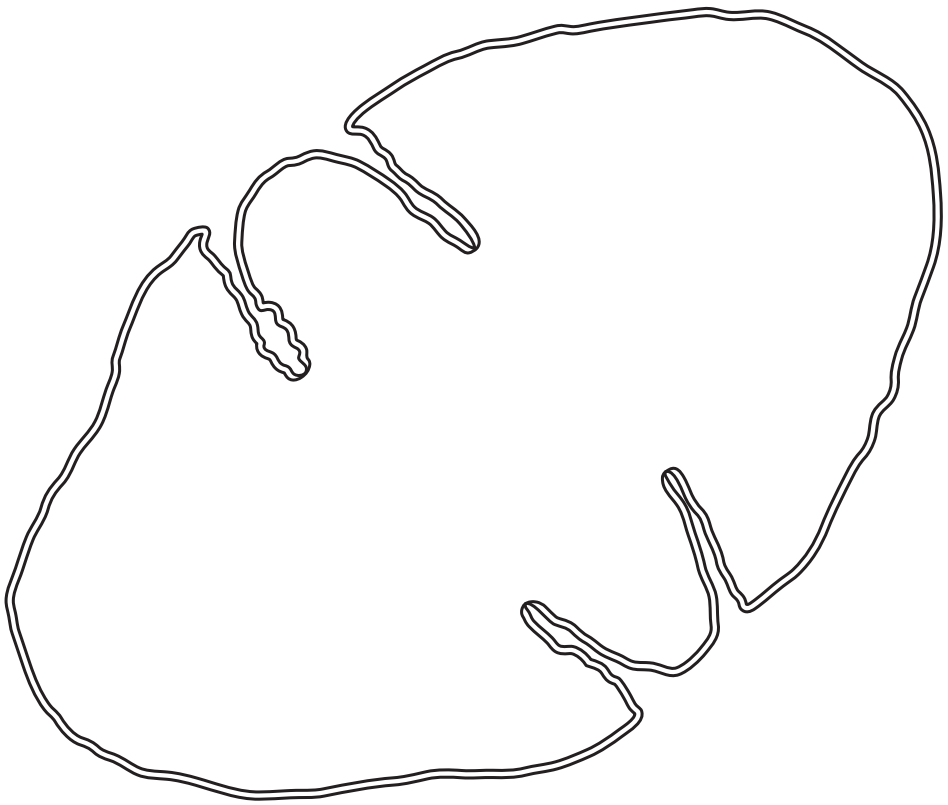


Fig. 2.2

[Total: 18]

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