CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **9700/32**

Paper 3 Advanced Practical Skills **May/June 2007**

2 hours

Candidates answer on the Question Paper.

Additional Materials: As listed in the Instructions to Supervisors.

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.
You may use a soft 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 **all** questions.
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 **10** printed pages and **2** blank pages.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

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.

1 You are required to estimate the concentration of reducing sugar in a fruit juice, labelled **F1,** by comparison with that in a range of glucose solutions.
You are provided with a 0.8% solution of glucose, labelled **F2**, Benedict's solution, distilled water and five test-tubes.

(a) Carry out the Benedict's test on fruit juice **F1**.
Describe and explain your results.

....

....

....

....

....

....[3]

(b) You are now going to test a range of glucose solutions that you will prepare yourself using **F2** and distilled water.
Carefully follow the instructions below.
You should present and record your observations and data in the space provided.
You will need to:

- read through the instructions carefully
- prepare the space on the next page so that it is ready for you to record the readings
- decide how many different strength glucose solutions you will need and prepare these by serial dilution
- carry out the tests so that you can compare your results with the result for the fruit juice.

(i) Record the data in the space below.

[6]

(ii) Estimate the concentration of reducing sugar in the fruit juice **F1**.

.... [1]

(c) The volume of reactants can affect the results that you obtain.

(i) State how you controlled this variable in your investigation.

....

....[1]

(ii) Identify two **other** significant sources of error in this experiment.

1 ....

....

2 ....

....[1]

(d) Suggest how the student could improve this experiment.

....

....

....

....

....[3]

 [Turn over

(e) A student used another carbohydrate, starch, to investigate the effect of pH on the activity of the enzyme amylase.

The data in Table 1.1 were obtained.

Table 1.1

pH	time taken for complete hydrolysis /min			mean time / min
	first run	second run	third run	
5	11	10	8	9.6
6	7	6	7	6.6
7	3	4	3	3.3
8	4	5	6	5.0
9	10	9	10	

(i) When the student first performed this investigation, the time taken for complete hydrolysis at pH 7 was 17 minutes.
Explain why the student discarded this result and repeated the experiment with freshly made solutions.

....

....[1]

(ii) Complete Table 1.1 by calculating the missing mean time value for pH 9.
You may use the space below to show your working.

Put your answer in the space on Table 1.1. [1]

(iii) Plot a graph to show the effect of pH on the complete hydrolysis of starch by amylase.
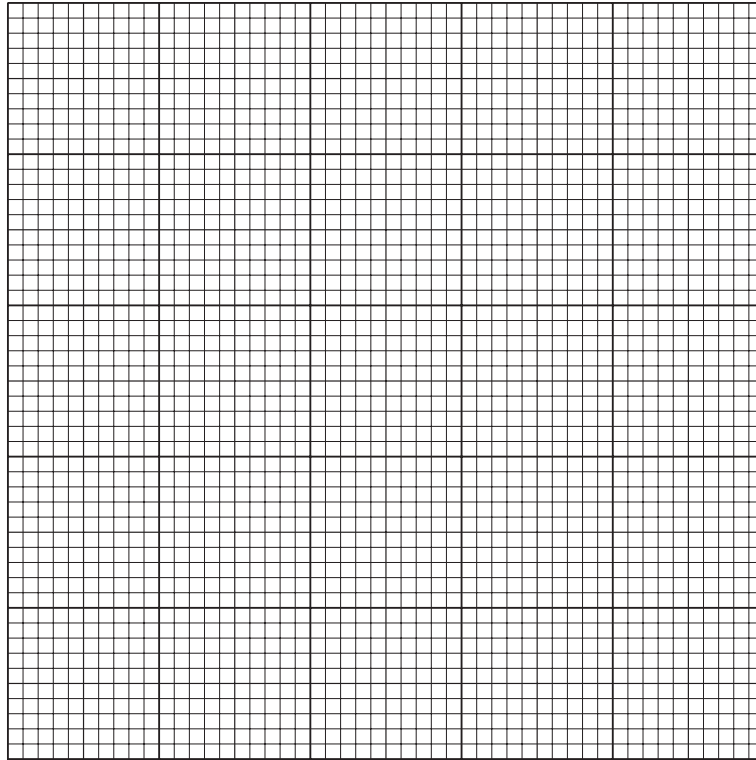
[3]

(f) State the relationship between pH and the hydrolysis of starch by amylase.

....

....[1]

(g) The student's hypothesis was:

• the activity of the enzyme would increase with increasing pH.

Discuss the student's hypothesis in relation to the results obtained.

....

....

....

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....[2]

[Total : 23]

2 **R1** is a slide of a stained longitudinal section through a root tip.
You are also provided with an eyepiece graticule that has been fitted to the eyepiece of your microscope and a stage scale (stage micrometer) printed on acetate sheet.
The 1 cm stage scale is divided into 100 divisions.
Each division is 0.1 mm

(a) (i) Draw a low-power plan diagram of **R1** and show the area in which you can see cells undergoing mitosis.

[2]

(ii) Carefully examine this area using the high-power of your microscope. Identify a cell that has a clear nucleus but is not undergoing mitosis.

Count the number of divisions of the eyepiece graticule across the cell.

number of divisions ....

Remove the slide **R1** and replace it with the stage scale.
Using the same magnification, adjust the focus until you can see the eyepiece graticule on top of the stage scale.
Count the number of eyepiece graticule divisions that match an exact number of stage scale divisions.

number of eyepiece graticule divisions ....

number of stage scale divisions ....

Use this information to calculate the actual width of the cell.
Show your working.

actual width of cell .... [2]

(iii) Estimate the uncertainty in the measurement of the actual width of the cell.

uncertainty = ... [1]

(iv) Suggest how an error in measuring the lengths could occur.

....

....

....[1]

(b) Fig. 2.1 is a photomicrograph showing cells from further up the root.
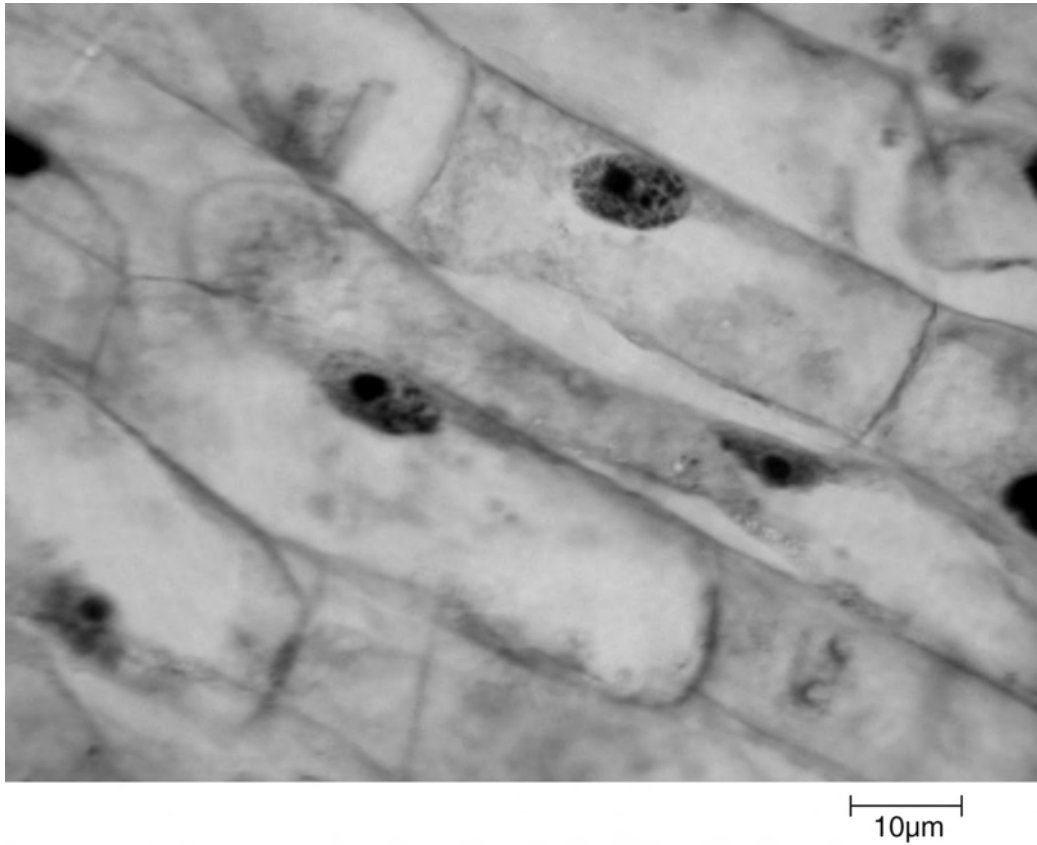

10μm

Fig. 2.1

(i) Prepare the space below so that it is suitable for you to compare and contrast a cell like the one you measured in **(a) (ii)** with the cells in Fig. 2.1.
Record your observations in the space below.

[4]

(ii) Roots grow in length.
State **one** observation from the materials provided that confirms this and suggest how such growth occurs.

....

....

....

....

....

....[2]

 [Turn over

(c) Cells undergoing mitosis can be seen in the specimen on slide **R1**.
In the space below, make a high-power labelled, drawing of **two** cells showing
chromosomes, undergoing different stages of mitosis.

[5]

[Total : 17]

[Paper total : 40]

11

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12

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