OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced GCE

BIOLOGY 2806/03/TEST

Practical Examination 2 (Part B – Practical Test)

Tuesday **24 MAY 2005** Morning 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Candidate's Plan (Part A of the Practical Examination)
Electronic Calculator
Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers in the spaces provided on the question paper.
- Read the instructions and questions carefully before starting your answers.

INFORMATION FOR CANDIDATES

- In this Practical Test, you will be assessed on the Experimental and Investigative Skills:
  Skill I: Implementing
  Skill A: Analysing evidence and drawing conclusions
  Skill E: Evaluating.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
Planning	**16**	
1	**28**	
2	**16**	
TOTAL	**60**	

This question paper consists of 9 printed pages, 2 blank pages and a Report Form.

Registered Charity Number: 1066969
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Answer **all** the questions.

Question 1 [60 minutes]

You are to investigate the activity of the enzyme starch phosphorylase on an extract of plant storage tissue.

Many plants store starch in particular locations such as the bases of stems (e.g. bulbous buttercup) or in roots before and during a dormant period. This provides the energy for growth the following year.

The breakdown of stored starch within cells is catalysed by starch phosphorylase. This enzyme uses phosphate to break glycosidic bonds.

$$\text{starch} + \text{phosphate} \longrightarrow \text{glucose phosphate}$$

Since the concentration of phosphate in cells is about 100 times that of glucose phosphate, this reaction proceeds to the right. However, this reaction can be reversed in extracts made from plant tissue.

Proceed as follows:

1 You are provided with two extracts of **filtered** plant storage tissue, one unboiled and one boiled.
Using a clean dropping pipette, remove a small sample from the **unboiled** extract and place it on one of the spotting tiles. Test the sample with a drop of iodine solution and record your result below.

Colour of extract on adding iodine solution. .....

Using a paper towel, wipe away the sample from the spotting tile.

2 Using the 5 cm^3 syringe, transfer 5 cm^3 of **unboiled** extract to each of three flat-bottomed tubes labelled **A**, **B** and **C**.

3 Rinse the 5 cm^3 syringe and transfer 5 cm^3 of **boiled** extract to tube **D**.

4 Using the 1 cm^3 syringes, add 1 cm^3 of ethanoic acid to tube **A** and add 0.5 cm^3 of sodium carbonate solution to tube **B**. Shake each tube to mix the contents.

5 Using a clean dropping pipette, transfer a small sample from tube **A** into a clean test tube. Rinse the dropping pipette in distilled water. Add three drops of universal indicator solution and shake to mix. Estimate and record the pH of sample **A** in the space below. Repeat this procedure with tube **B**.

pH of sample **A**. .....

pH of sample **B**. .....

6 You are provided with two spotting tiles with rows labelled **A** to **D**. Using a clean dropping pipette, place two drops of iodine in each well of each row on both tiles.

7 Rinse a 1 cm^3 syringe and add 1 cm^3 of glucose phosphate solution to each of tubes **A**, **B**, **C** and **D**. Shake the tubes to mix the contents and start the stop clock or stopwatch.

8 Using the spotting tile, iodine solution and **a rinsed dropping pipette for the contents of each boiling tube on each occasion**, remove samples at regular intervals from each tube and note the time taken for the **first** appearance of any starch in each of the tubes. If there is no starch after fifteen minutes record "no starch".

(a) Record your results in a suitable form in the space below.

[Turn over

The plant extract was prepared by crushing and filtering some storage tissue.

(b) Explain the result obtained in step **1** when iodine solution was added to the **unboiled** extract.

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(c) Assuming that starch phosphorylase was present in the extract, explain the results that you obtained in each tube.

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(d) The synthesis of starch is an active, energy-consuming process. State the **immediate** source of the energy in your procedure and in plant storage organs, such as the stem of the bulbous buttercup, *Ranunculus bulbosus*.

(i) in your procedure .....

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(ii) in plant storage organs .....

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(e) The **breakdown** of stored starch within cells is catalysed by starch phosphorylase.

Explain why the reaction you have observed in extract **C** took place.

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(f) Explain how your results rule out the possibility that a substance in plant extract **C** was turned to starch by glucose phosphate.

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(g) Evaluation exercise

Write an evaluation of the procedure that you followed and of the results that you have obtained.

You should include limitations of your procedure and suggest ways in which the experiment may be improved to give more accurate and reliable results.

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[Total: 28]

Question 2 [30 minutes]

(a) Slide **S** is a cross-section through a stem of *Ranunculus* (buttercup). Examine slide **S** using the low power objective of your microscope.

Make a low power plan drawing **of a quarter of the section**, using the outline below, to show the distribution and relative proportions of the different tissues as accurately as possible. Label the tissues on your drawing.

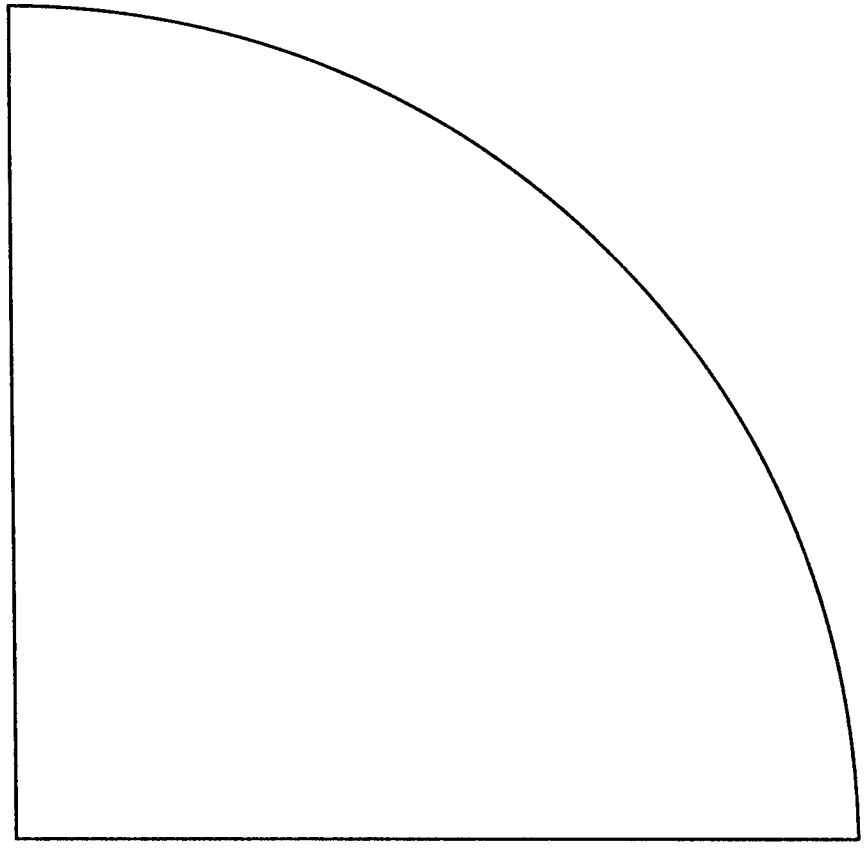

Fig. 2.1

(b) (i) Place the transparent grid provided over the section of stem that you have drawn in Fig. 2.1. Use the grid to determine the percentage of Fig. 2.1 that is represented by **vascular tissue.**

Percentage of stem that is vascular tissue = ... %

(ii) Calculate, as a percentage, the area of the stem in Fig. 2.1 that is represented by **phloem tissue.**

Percentage of stem that is phloem tubes = ... %

(iii) Make a high power drawing of a representative portion of phloem tissue including at least **three** sieve tubes and **three** companion cells.

[Total: 16]

END OF QUESTION PAPER

REPORT FORM

The teacher responsible for the supervision of the Practical Test is asked to report on the following:

(a) Any particular difficulties encountered in making preparations for the Practical Test.

(b) Whether it was necessary to make any substitutions for the materials listed in the Instructions. If so, submit a copy of the results obtained by a teacher or technician, using the substituted materials, on top of the candidates' scripts.

(c) Any difficulties experienced by the candidate due to deficient materials or faulty apparatus. If so, give brief details.

(d) Any assistance given to the candidate with respect to colour blindness or other physical handicap. If so, give brief details.

Other cases of hardship, for example illness or temporary disability, should be reported directly to OCR, by the Examinations Officer, as a normal Application for Special Consideration.

Signed .....

Information that applies to **all** candidates should be given on the first candidate's script **only**.
