

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
 General Certificate of Education
 Advanced



CYD-BWYLLGOR ADDYSG CYMRU
 Tystysgrif Addysg Gyffredinol
 Uwch

316/01

BIOLOGY PRACTICAL – BI6

SPRING 2007

For examiner's use	
1	
2	
3	
Total	

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces provided above.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

You are reminded that this is a record of your own work and that no certificate will be awarded to a candidate detected in any unfair practice.

Recommended maximum times:

Question 1 45 minutes

Question 2 1hr 15 minutes implementation, 45 minutes analysis

Question 3 60 minutes

- (c) (i) List the apparatus and materials required for this practical. Include apparatus so that you could measure the **volume** of gas produced. [2]

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- (ii) Draw a diagram of the apparatus you would set up in order to carry out the experiment. [2]

(d) Identify the key variables under the following headings:

(i) Independent variable; [1]

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(ii) Dependent variable (from which the rate of photosynthesis can be derived); [1]

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(iii) List **two** variables, which must be kept constant throughout the experiment. [1]

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(e) When discussing photosynthesis the term ‘limiting factor’ is commonly used. Explain what this means. [1]

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(f) It would be necessary to use sodium hydrogen carbonate in this experiment. Explain why it is necessary. [1]

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(g) Apart from the risk of using glassware, identify **one other** risk for this experiment and give the correct procedure for minimising the risk. [1]

Risk

Procedure for minimising risk.

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Question 2: Analysis and Evaluation

The substrate concentration in an enzyme-catalysed reaction affects the rate at which the reaction takes place.

Follow the procedure out-lined below to determine the effect of hydrogen peroxide concentration on the rate of reaction.

The following are provided for you:

Syringe

Potatoes

Hydrogen peroxide solution, 0.5 mol dm^{-3} , 1.0 mol dm^{-3} , 1.5 mol dm^{-3} , and 2.0 mol dm^{-3} .

Cork borer

Phosphate buffer, pH7

Burette

Glass tubing

Boiling tube

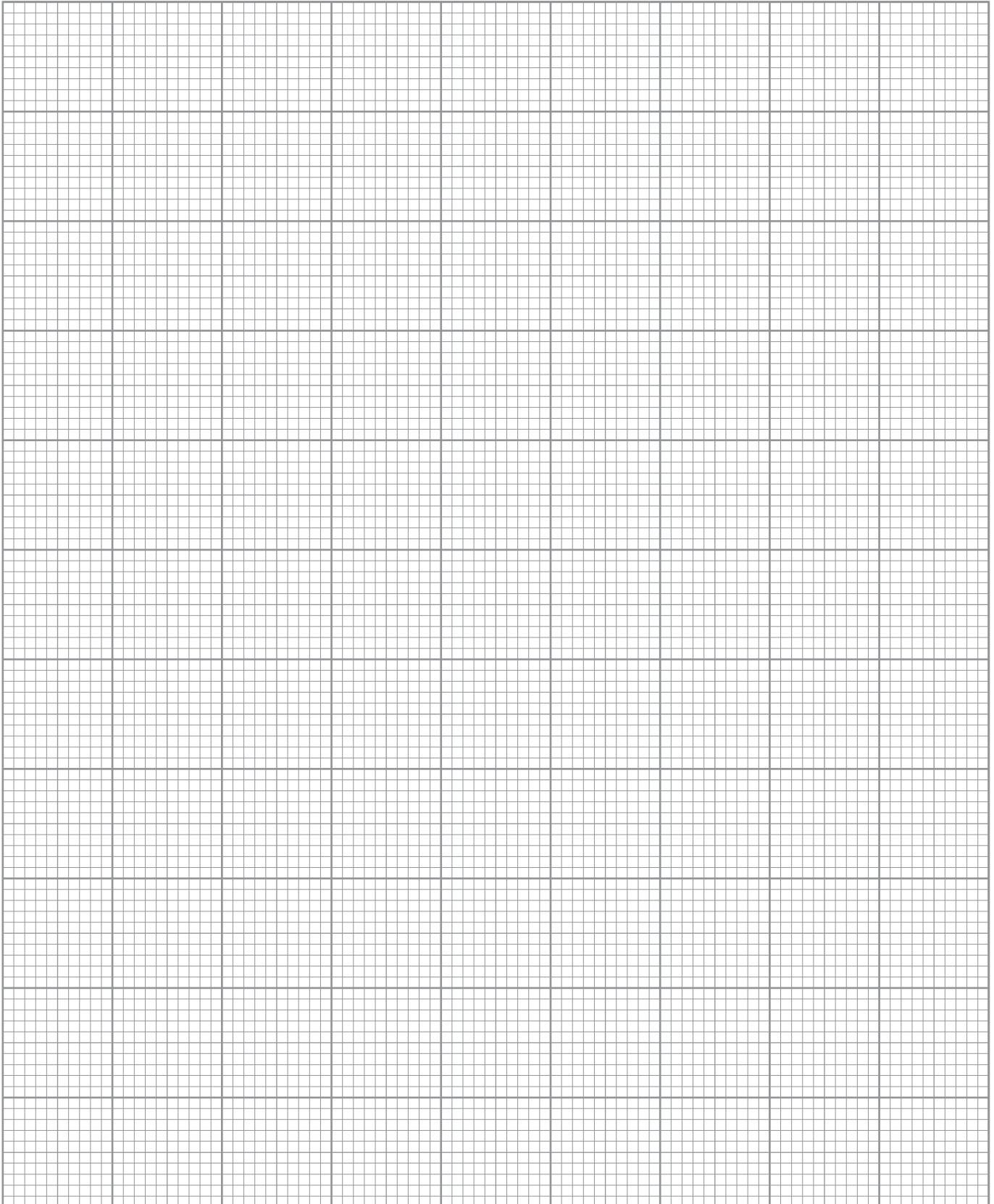
Rubber bung with hole

Water trough

1. Using a syringe, place 10 cm^3 of 0.5 mol dm^{-3} hydrogen peroxide solution into the boiling tube.
2. Add to this 2 cm^3 of phosphate buffer, pH7.
3. Cut ten discs from a cylinder of potato using the cork borer. Ensure that the discs of potato are no more than 2 mm thick and are of a consistent thickness.
4. Place the ten discs of potato into the boiling tube. Shake the tube to ensure the separation of the discs.
5. Connect the boiling tube to the burette.
6. Leave for 20 seconds and then record the volume of oxygen produced in 3 minutes.
7. Discard the contents of the boiling tube, wash the tube and use fresh materials to get a second count. Repeat once more to obtain a third count.
8. Repeat the whole procedure to obtain results with each of the hydrogen peroxide solutions 1.0 , 1.5 and 2.0 mol dm^{-3} .

- (a) Record your readings in a suitable table. Use the readings for oxygen production at each hydrogen peroxide concentration to calculate the mean rate of oxygen production per minute. Add this to your table. [4]

- (b) On the grid below, plot a graph of the mean rate of oxygen production at each hydrogen peroxide concentration. [7]



- (c) Show error bars on your line for the measurements at each hydrogen peroxide concentration. [2]

(d) (i) State the relationship between substrate concentration and the rate of oxygen production. [1]

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(ii) Using detailed biological knowledge, give an explanation for your observation in (i). [2]

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(e) You are required to add a phosphate buffer to the hydrogen peroxide in the boiling tube. Explain why this is necessary. [3]

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(f) (i) Suggest **two** ways in which the accuracy of your results could have been improved.[2]

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(ii) Suggest **one** way in which the reliability of your results could have been improved.[1]

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(iii) What do the error bars suggest about **your** results?

[1]

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(g) If this experiment was set up to investigate the effect of enzyme concentration, why would using potato as the source of enzyme lead to inaccuracies? Suggest how it would be possible to overcome this inaccuracy. [2]

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(Total 25 marks)

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Question 3: Observation and Microscopy

The following are provided for you:

Microscope, eyepiece graticule, micrometer and a slide of T.S. Spinal cord.

- (a) Produce an outline **low** power plan drawing of the specimen supplied.
(It may be necessary to move the specimen in the field of view)

[2]

- (b) Label the completed drawing, indicating clearly those regions that you label.

[2]

(c) Calibrate the microscope using the **high** power objective. Show your workings. [3]

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(d) Using your calibration, calculate the actual width of the central canal. [1]

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(e) Calculate the magnification of your drawing. [1]

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(f) (i) There are two, clearly distinguishable, regions in the section of spinal cord, the grey and white matter. Briefly state what these regions are composed of. [2]

Grey matter

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White matter

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(ii) In the canal at the centre of the spinal cord there is a fluid. What is the term commonly used to describe this fluid? [1]

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(iii) Name a reflex action commonly associated with the spinal cord. [1]

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(Total 13 marks)