

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 2006**

For examiner's use	
1	
2	
3	
<b>Total</b>	

**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) The apparatus and materials required for this practical would be:

Bunsen burner, safety mat, gauze, tripod	Tubing / Connectors
Soda Lime	Taps
Cotton Wool / Wire mesh	Beakers
Boiling tubes	
Thermometer	
Rubber bungs	
Graduated capillary tubing	
Peas	
Clamps / Spring clips	
Manometer fluid	
Syringes	

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 variables (from which the rate of respiration 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) Suggest a control experiment for your investigation. [1]

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(f) It would be necessary to use soda lime in this experiment. Soda lime absorbs carbon dioxide. Explain why it is necessary. [1]

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(g) (i) Identify the risk for soda lime and give the correct procedure for minimising the risk. [1]

Risk .....

Procedure for minimising risk.

.....

.....

(ii) Identify a risk when using glass tubing and give the correct procedure for minimising the risk. [1]

Risk .....

Procedure for minimising risk.

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**Question 2: Analysis and Evaluation**

It is possible to determine the water potential of potato tubers by immersing the tissues in a range of different sucrose solutions.

Carry out the following procedure to determine the water potential of potato tubers supplied to you.

You will be supplied with the following:

4 sucrose solutions (0.25, 0.5, 0.75, 1.0 mol dm <sup>-3</sup> )	
1 potato tuber	Petri dishes/watch glasses
Cork borer	Tile
Distilled water	Forceps
Electronic balance	Marker pen / Labels
Scalpel	Paper towel / filter paper
Test tubes	Cling film / Rubber bungs
Syringes	Ruler

1. Place 5 cm<sup>3</sup> of distilled water into a test tube, seal the mouth of the test tube and label the test tube as 'distilled water'.
2. Place 5 cm<sup>3</sup> of 0.25 mol dm<sup>-3</sup> sucrose solution into another test tube, seal and label it as '0.25 mol dm<sup>-3</sup>'.
3. Repeat this until you have a test tube for each of the solutions in the range, 5 test tubes in total.
4. Use a cork borer to produce cylinders of potato about 25 mm in length. Ensure that you have one for each tube.
5. Measure the mass of the first cylinder after blotting the surface to remove excess fluid. Record the mass and place the cylinder into the test tube labelled 'distilled water'. Re-seal the tube.
6. Repeat this procedure until a potato cylinder has been placed in each tube, 5 in all.
7. Leave the test tubes for at least 30 minutes, after this time the cylinders should be removed in the sequence that they were immersed.
8. After the cylinders have been blotted, they should be re-weighed. The data collected should then be recorded in a suitable table.

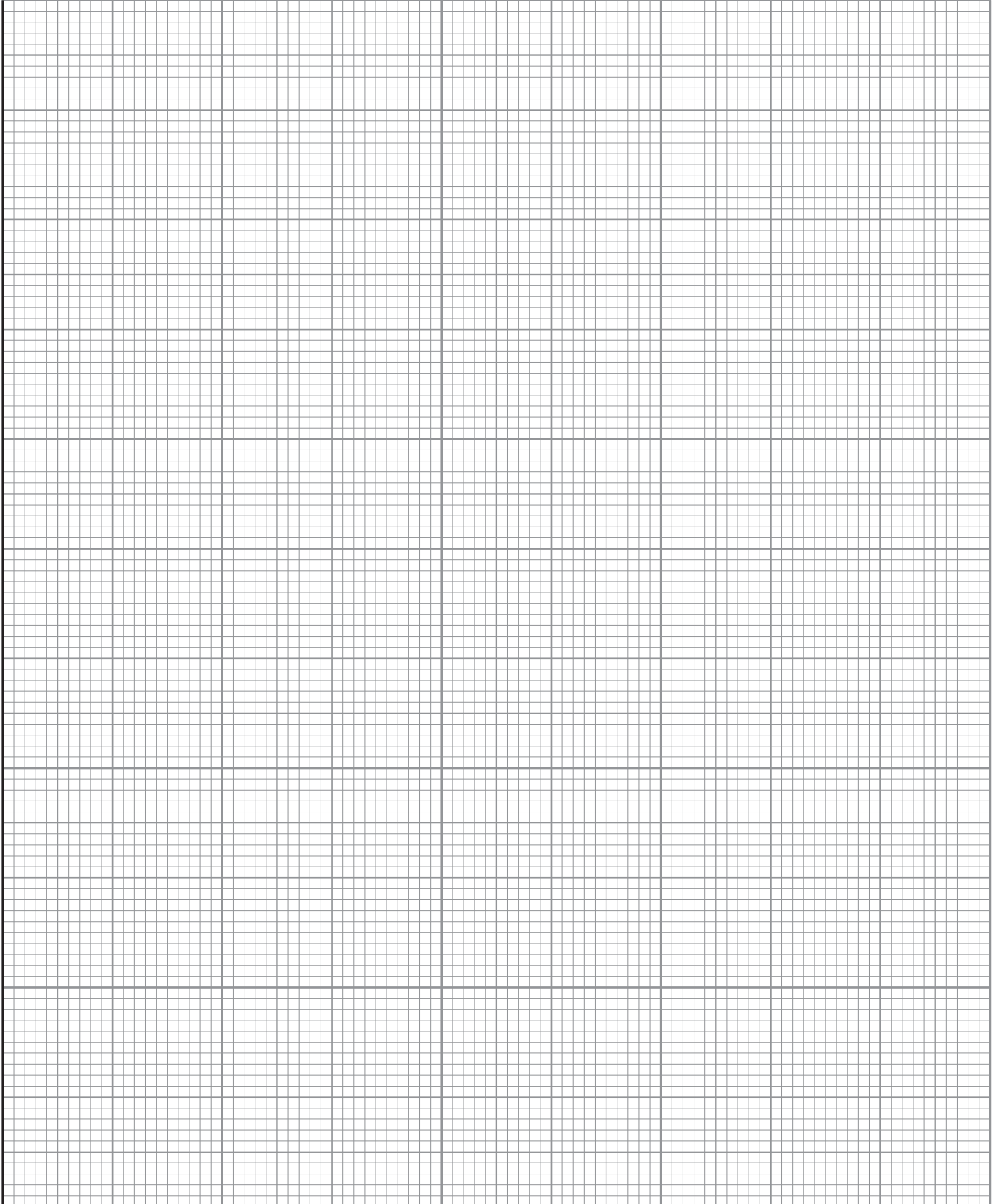


(a) Record your results in a suitable table.

[4]

(b) On the grid below plot a graph of your results.

[7]

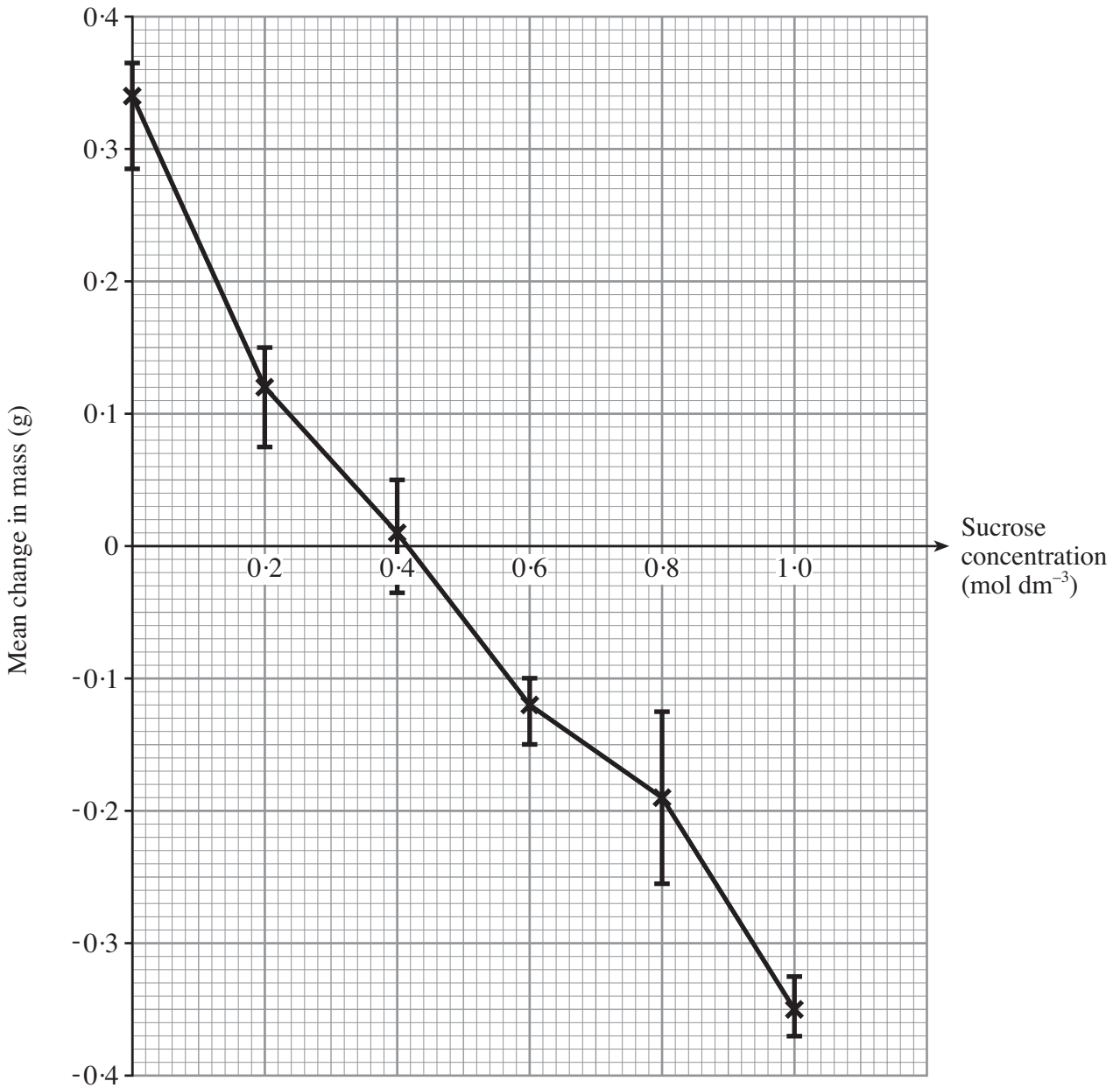




- (iii) Using the table on page 11, what is the water potential of the potato tissue used in your experiment? [1]

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- (e) Below is a graph obtained when Gwydion undertook a similar experiment.



What do the error bars suggest about the reliability of Gwydion's results? [2]

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(f) State **one** way in which the reliability of your results could be improved. [1]

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(g) Suggest **two** ways in which the accuracy of your results could be improved. [2]

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(h) Suggest why it is necessary to cover the mouth of the test tube. [1]

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(i) It is desirable to use cylinders from a single potato, why is this important? [1]

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(j) Suggest how changing the potato might affect your results. [1]

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**(Total 25 marks)**

**Question 3: Observation and Microscopy**

The following are provided for you:

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

- (a) Produce an outline, low power, plan drawing of the specimen supplied. [2]

- (i) Label the completed drawing, indicating clearly those regions that you label. [2]

- (ii) Indicate clearly and label on your drawing the point of dehiscence of the anther. [1]

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

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(c) (i) Using the high power objective, produce an **outline drawing** for three of the visible pollen grains within the anther. [2]  
Label the pollen grains as **A, B** and **C**.

(ii) Measure the width of each of the pollen grains at their widest points in eye piece units and calculate the mean width of the pollen grains in eyepiece units. Record these dimensions below. [2]

**A** ..... **B** ..... **C** .....

Mean width of pollen grains: .....

(iii) Record the width of your drawing for pollen grain **B**. [1]

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(iv) Using your calibration calculate the actual width of pollen grain **B**. [1]

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(v) Calculate the magnification of your drawing for pollen grain **B**. [1]

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**(Total 15 marks)**