Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced Subsidiary/Advanced

WJEC CBAC

CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Addysg Gyffredinol
Uwch Gyfrannol/Uwch

313/01

BIOLOGY PRACTICAL – BI3

SPRING 2006

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

Question 1: Planning. This is a planning exercise only. There is no need to carry out the investigation.

Investigation:

Like all plant cells, beetroot cells have both a cellulose cell wall and a plasma membrane. Inside the beetroot is a red pigment (Belatin). Any changes in the plasma membrane will result in some of the cell contents being released and the Belatin will colour any surrounding bathing tissue.

Plan an investigation to find out how the selective permeability of beetroot cells is affected by temperature. Think of how you could investigate the effect of different temperatures on the selective permeability of beetroot cells.

(a) Suggest a prediction for this investigation. [1]

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(b) Briefly describe the theory to support your prediction. [3]

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

(i) Independent variable [1]

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(ii) Dependent variable [2]

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(d) Draw and label the arrangement of the apparatus as you would set it up. [3]

(e) List all the apparatus and materials that you are likely to require. [3]

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(f) Risk Assessment.

(i) Identify **one** safety risk to the person carrying out **this** investigation. [1]

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(ii) Describe how this risk could be minimised. [1]

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(g) Give an account of the steps involved in your investigation. [10]
(It is essential that your method is repeatable by another person)

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(Total 25 marks)

Turn over.

Question 2: Analysis and Evaluation

In this investigation you are going to carry out an experiment to determine the effect of temperature on lipase. Lipase is an enzyme that breaks down fats such as the diglyceride triacetin. Using the indicator Phenol Red which changes from red in alkaline conditions to yellow in acidic conditions, you need to measure the time taken for lipase to break down sufficient fat to bring about this colour change.

You are given:

20 Test-tubes
1 250 cm^3 Beaker
2 10cm^3 Measuring Cylinders/Syringes

Thermometer
Stopwatch
Bunsen Burner
Tripod
Safety mat
Gauze

1. Into each of 10 test tubes place:
   2 cm^3 Triacetin
   1 cm^3 Sodium Bicarbonate Solution
   5 drops of Phenol Red

2. Into each of another 10 test tubes place:
   2 cm^3 1% lipase

3. Heat up water in the beaker to **25 °C** then switch off Bunsen burner.

4. Stand two test tubes of triacetin (point 1) and two of lipase (point 2) in your heated water bath for 2 minutes.

5. Record the temperature.

6. Using the tubes in the water bath, add the lipase from one tube to one of the tubes containing triacetin. Time how long it takes to change colour from red to yellow.

7. Repeat point 6 for the second tube. Do not worry about taking the temperature again assume that the temperature has not altered. All tubes should be removed from the water bath.

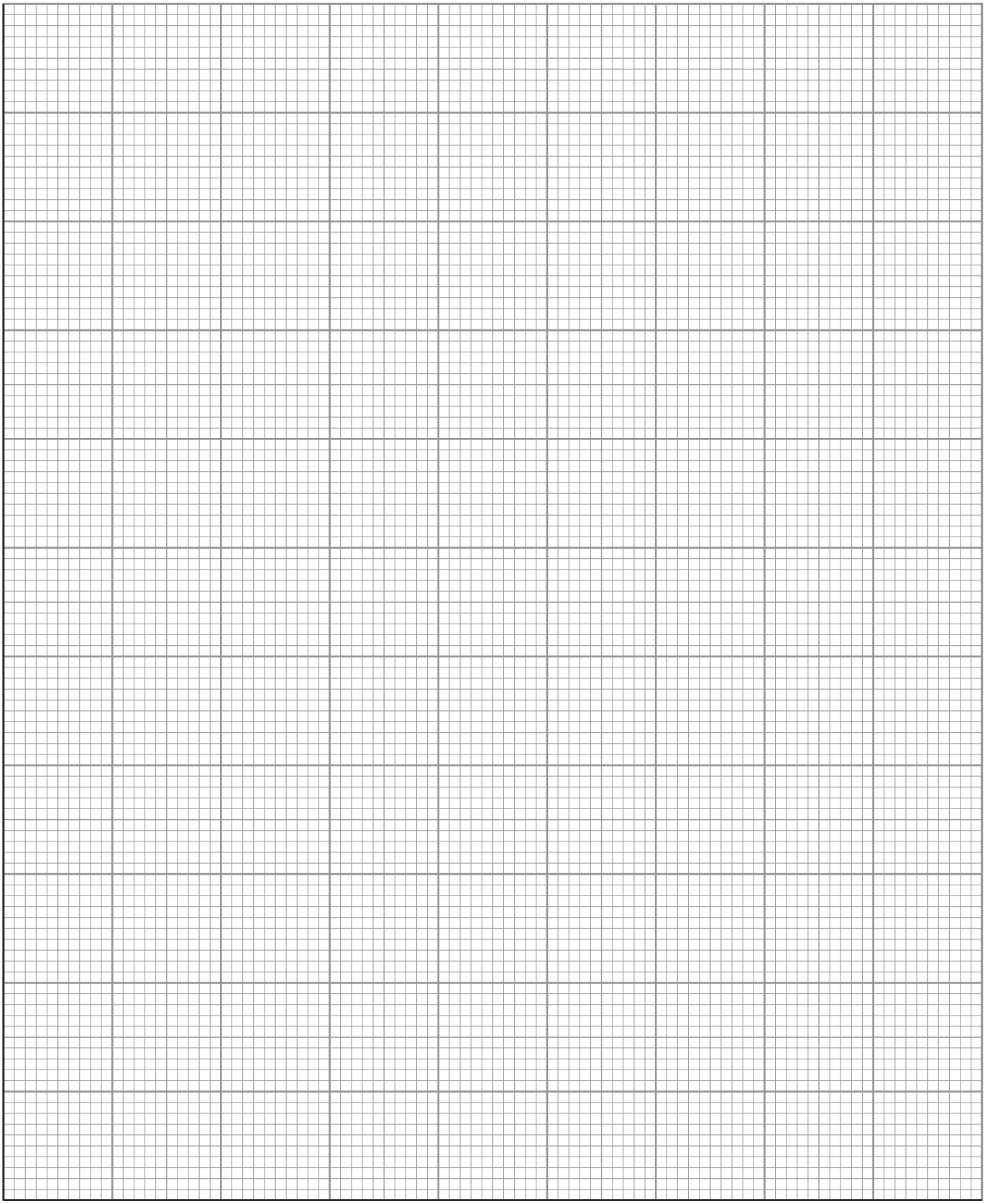
8. Using the same beaker, heat water up to **30 °C** then switch off Bunsen burner.

9. Repeat points 4, 5, 6 and 7 using another two test tubes of triacetin and two of lipase.

10. Repeat points 3-7 for a range of temperatures **35 °C**, **45 °C** and **60 °C**.

(a) Below, record your results **accurately** and **clearly** in a table. [4]

(b) On the grid below, plot a graph of your mean results. [6]



(c) (i) Suggest **one** way in which the **reliability** could have been improved. [1]

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(ii) Suggest **one** way in which the **accuracy** could have been improved. [1]

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(d) Describe the pattern shown in **your** graph. [2]

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(e) Explain **your** results, in biological terms. [5]

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(f) A similar experiment was carried out at pH 4. The lipase appeared to show no activity at any temperature. Explain these results in terms of enzyme activity. [2]

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(g) A new drug **ATL-962** (lipase inhibitor) was trialled in the USA in 1999. Suggest **two** ways in which the drug might inhibit lipase. How would you use this technique to determine the way in which this new drug works? [3]

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(Total 24 Marks)

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Question 3: Observation and Microscopy

You are provided with the following:

Microscope, eye piece graticule, stage micrometer and a prepared slide of a transverse section (TS) of a leaf *(Ligustrum)*.

(a) Make a labelled, low power, plan drawing of the section you can see under your microscope, to include the midrib. [6]

(b) Measure the diameter of widest point of the midrib in eyepiece units (X-X). [2]

Measurement of X-X = ... eyepiece units.

Measure the thickness of the mesophyll layer in eyepiece units (Y-Y).

Measurement of Y-Y = ... eyepiece units.

On your diagram in part (a) indicate clearly the two measurements you have taken, labelling them X-X, and Y-Y respectively.

(c) Calibrate the eyepiece graticule at low power. Record all your workings in the space below. All your steps must be clear and easy to follow. [3]

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(d) Convert measurement X-X from eyepiece units to an actual measurement using the calibration value from part *(c)*. [2]

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(e) Calculate the magnification of your drawing using the measurement labelled X-X in part *(b)*. [2]

Use the workings from earlier parts of this question for the calculation. All steps must be recorded clearly and be easy to follow.

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(Total 15 marks)