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

311/01

BIOLOGY

MODULE BI1

A.M. MONDAY, 5 June 2006

(1 hour 30 minutes)

For Examiner's Use Only

Total Marks	

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

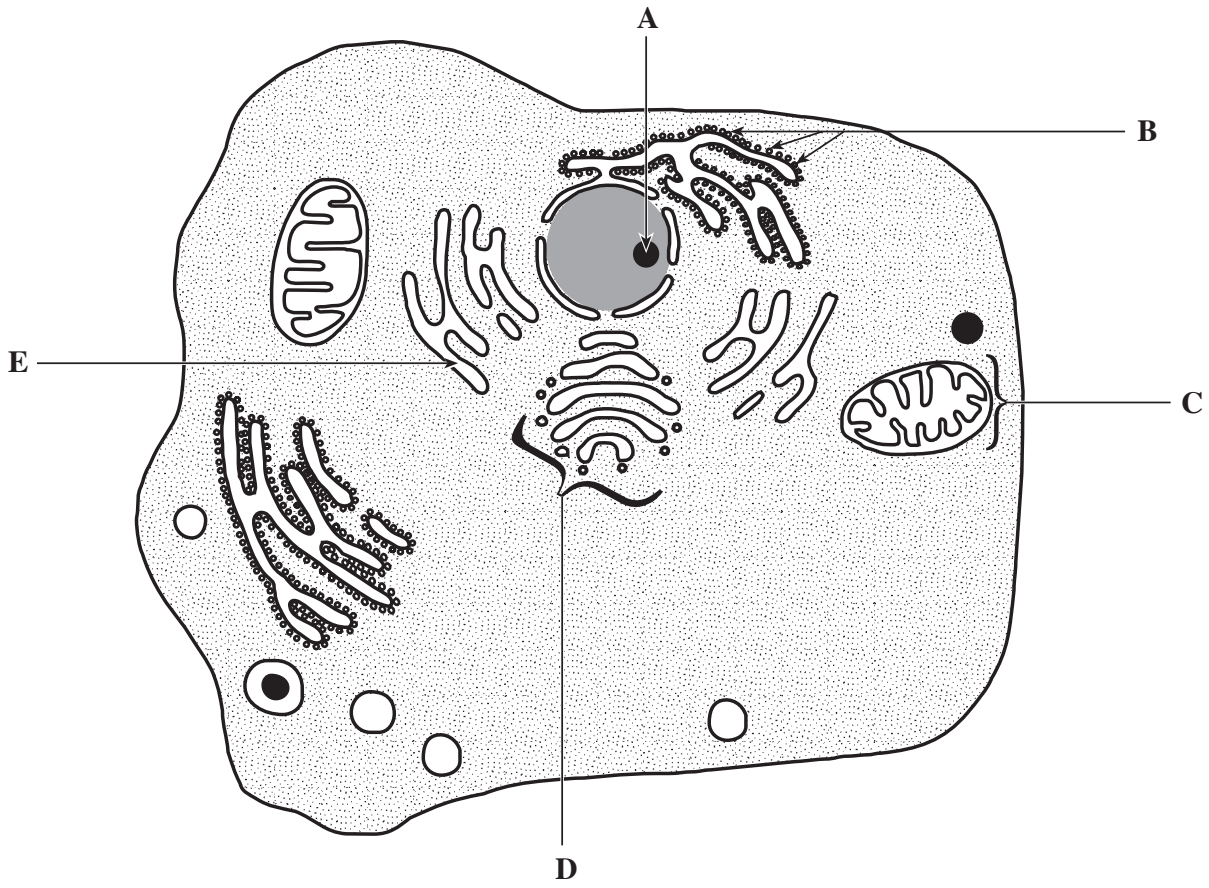
The number of marks is given in brackets at the end of each question or part-question.

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

The quality of written communication will affect the awarding of marks.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

1. The diagram shows a cell viewed using an electron microscope.



(a) (i) Name the structures labelled **A** to **E**. [5]

A .....

B .....

C .....

D .....

E .....

(ii) Using the appropriate letter, identify [2]

one structure **present** in a prokaryotic cell .....

one structure **absent** from a prokaryotic cell .....

(b) With reference to the diagram:

(i) explain how it is possible to tell that this is a view using an electron rather than a light microscope; [2]

.....

.....

(ii) State which of the **two** structures **A** to **E** are found in large numbers in a cell with a high level of metabolic activity. Give a reason for **each** choice. [2]

.....

.....

.....

(Total 11 marks)

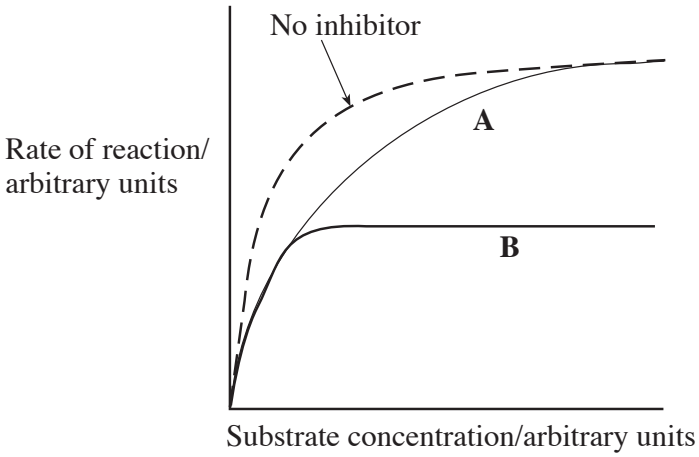
2. *(a)* Apart from the presence of inhibitors and substrate concentration, state **three** factors that affect the rate of an enzyme controlled reaction. [3]

.....

.....

.....

(b) The graph shows how the rate of an enzyme catalysed reaction varies with substrate concentration when affected by a competitive inhibitor and a non-competitive inhibitor.



(i) Which line shows the competitive inhibitor? [1]

.....

(ii) Give a reason for your choice in *(b)*(i). [1]

.....

.....

(iii) Explain how a competitive inhibitor works. [3]

.....

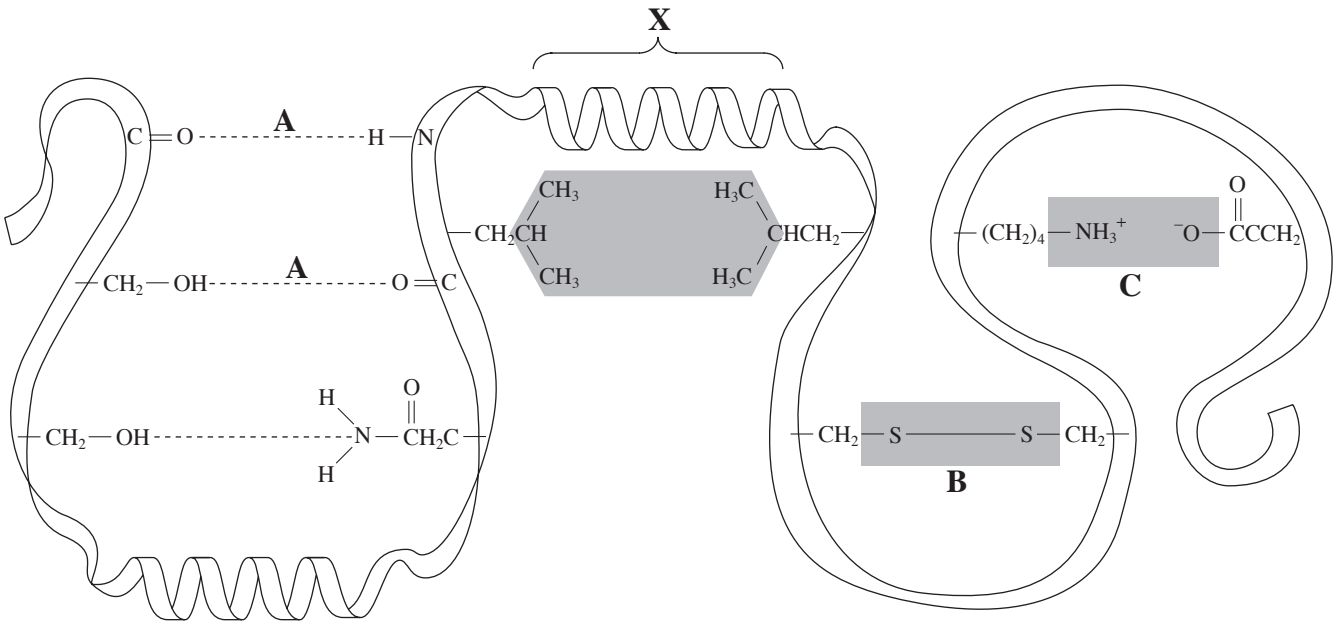
.....

.....

.....

(Total 8 marks)

3. The diagram shows the structure of a protein. The Letters **A** to **C** indicate three types of bond found in a protein.



(a) (i) State the name of the type of bond found in the primary structure of a protein. [1]

.....

(ii) State the names of the types of bond **A** to **C**. [3]

A .....

B .....

C .....

(b) The area marked **X** on the diagram forms part of the secondary structure of a protein.

(i) State the name given to this form of secondary structure. [1]

.....

(ii) How is this form of secondary structure held together? [1]

.....

.....

.....

(iii) State the name of a further form of secondary structure. [1]

.....

(c) State the highest level of protein structure shown in the diagram. [1]

.....

(d) A cellulose molecule is made up of a large number of monosaccharide units.

(i) Name the monosaccharide and its form. [2]

.....

(ii) Describe how two monosaccharides are joined together. [2]

.....

.....

.....

(iii) Explain how the structure of cellulose makes it suitable for use in plant cell walls. [2]

.....

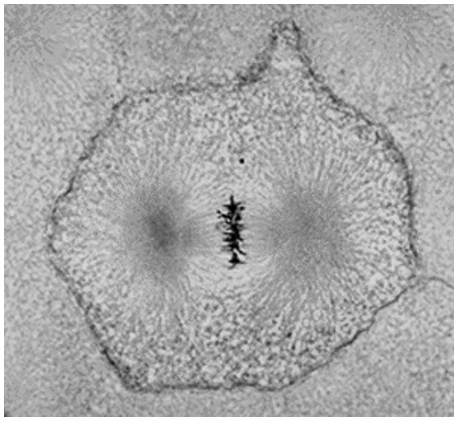
.....

.....

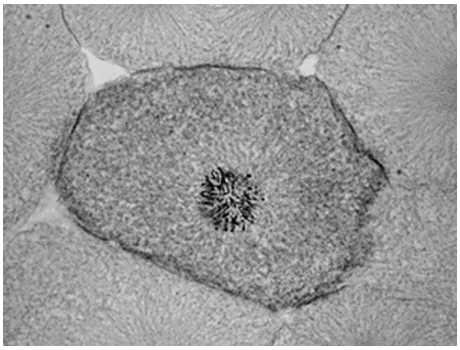
(Total 14 marks)

4. The photographs **A** to **D** below show the four stages in the process of mitosis.

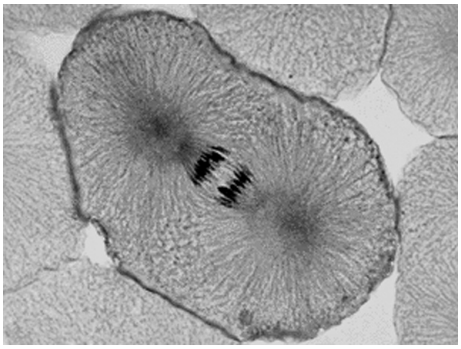
A



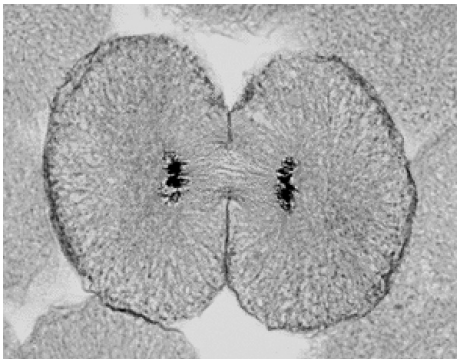
B



C



D



(a) Place the letters of these diagrams in the correct sequence in which the stages occur. [2]

....

(b) Name the stage of mitosis during which the following occur.

(i) Chromatids can first be seen using a light microscope. [1]

.....

(ii) Nuclear envelope disappears. [1]

.....

(iii) Pairs of chromatids become attached to their spindle fibres, by their centromeres, at the equator. [1]

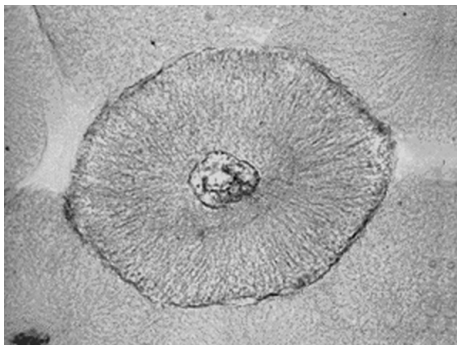
.....

(iv) Chromatids become chromosomes. [1]

.....

(c) Photograph **E** shows a cell during a part of the cell cycle called interphase. This is often called the 'resting phase'.

E



Explain why it is incorrect to regard the cell as 'resting' during interphase. [3]

.....

.....

.....

(d) What is the significance of mitosis and why is it important to plants? [3]

.....

.....

.....

.....

(e) Meiosis is used to produce gametes for sexual reproduction in mammals.

Give **three** ways in which meiosis leads to variation in offspring. [3]

.....

.....

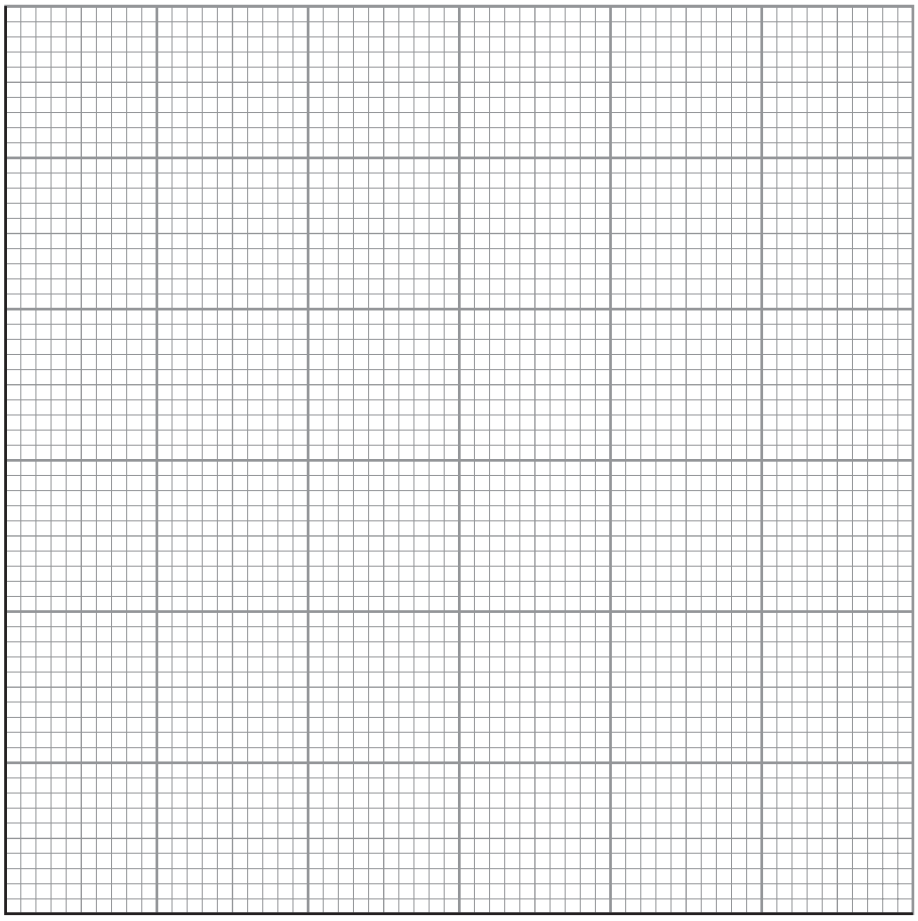
.....

(Total 15 marks)

5. Strips of onion epidermis of approximately equal dimensions were placed into sucrose solutions of different concentrations. After 20 minutes the strips of epidermis were removed and the change in mass of the strips from the start of the experiment was determined. The results are shown in the table below.

Concentration of sucrose / M	*Change in mass / %*
0.15	+4
0.20	+3
0.25	+2
0.35	−2
0.40	−4
0.50	−22
0.55	−37

(a) (i) Plot a graph showing the variation in mass change with the concentration of sucrose. [4]



(ii) Use your graph to determine the concentration of sucrose at which there is no change in mass. Write the value on the line below. [1]

.....

(iii) Explain, in terms of water potential why there is no change at this point. [3]

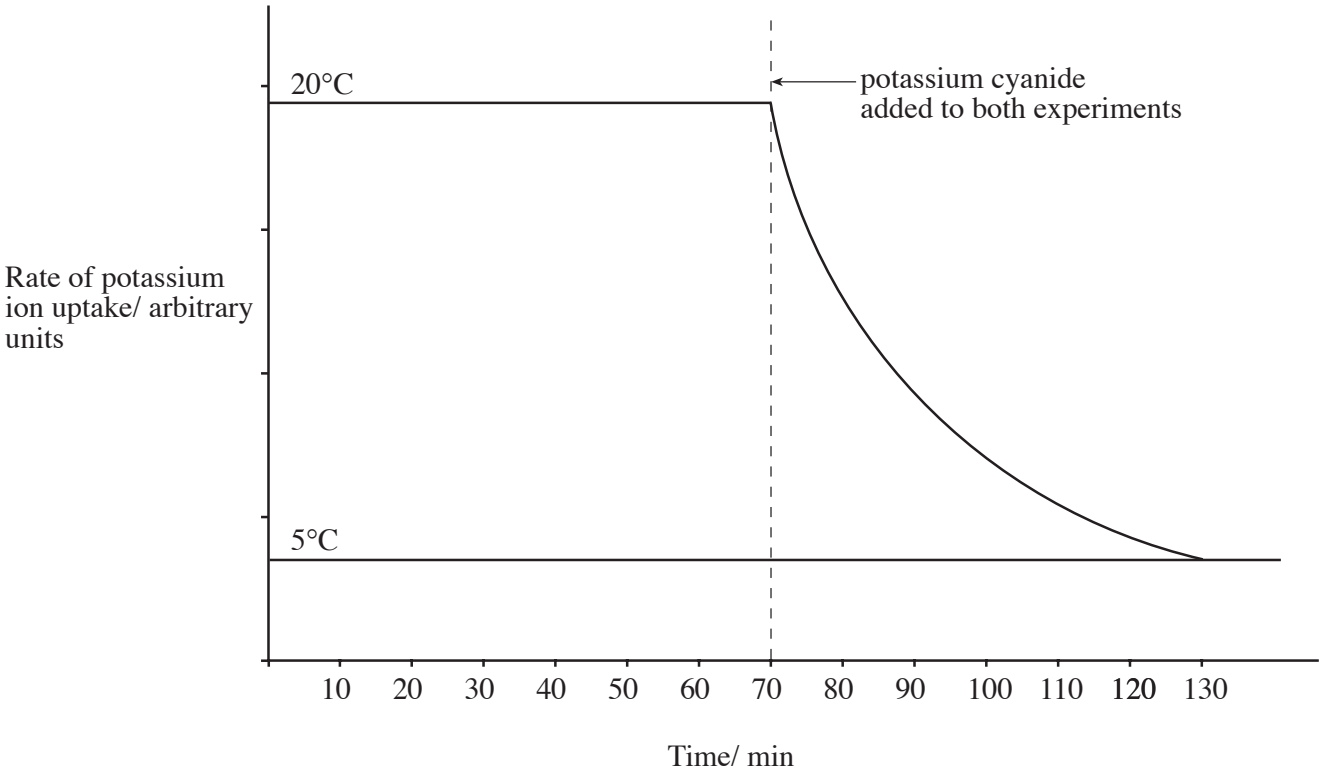
.....

.....

.....

.....

(b) The graph below shows the absorption of potassium ions by young cereal plant root hairs which were kept in aerated solutions maintained at two different temperatures. After 70 minutes potassium cyanide was added to the solutions at each temperature.



(i) How does the information given show that the root hairs take up the ions by **active transport**? [3]

.....

.....

.....

.....

(ii) Explain, why at low temperatures potassium uptake continues after the addition of potassium cyanide. [1]

.....

.....

(Total 12 marks)

6. Answer **one** of the following questions.
Any diagrams included in your answer must be fully annotated.

Either, *(a)* (i) Describe how recombinant DNA is produced during the manufacture of insulin. [7]

(ii) Outline the problems encountered with the use of recombinant DNA technology. [3]

Or *(b)* Describe how the base sequence of a gene is converted into the primary structure of a protein. [10]

(Total 10 marks)