Centre No.					
Candidate No.					

Paper Reference (complete below)						
				/		

Surname	Initial(s)
Signature	

Paper Reference(s)

6106/03

Edexcel GCE

Biology

Biology (Human)

Advanced

Unit Test 6 Paper 03 Synoptic Paper

Thursday 19 June 2003 – Afternoon

Time: 1 hour 10 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4B	
5H	
Total	

Materials required for examination
Answer book AB04
Ruler

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, the paper reference, your signature, your surname and initials. The paper reference is shown above.
Check that you have the booklet for the correct unit.
Answer Questions 1 and 2 in the spaces provided in this booklet.
You must then answer *either* Question 3 *or* 4B *or* 5H in a separate answer book.
Complete the details on the front of the answer book and fasten it loosely but securely inside this booklet. If you need to use additional answer sheets, attach them loosely but securely inside this booklet.
Show all the steps in any calculations and state the units. Calculators may be used.
Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for individual questions and parts of questions are shown in round brackets: e.g. (**2**).
The total mark for this paper is 38.

Advice to Candidates

You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, taking account of your use of grammar, punctuation and spelling.
This question paper is designed to give you the opportunity to make connections between different areas of biology and to use skills and ideas developed throughout the course in new contexts. You should include in your answers any relevant information from the whole of your course.

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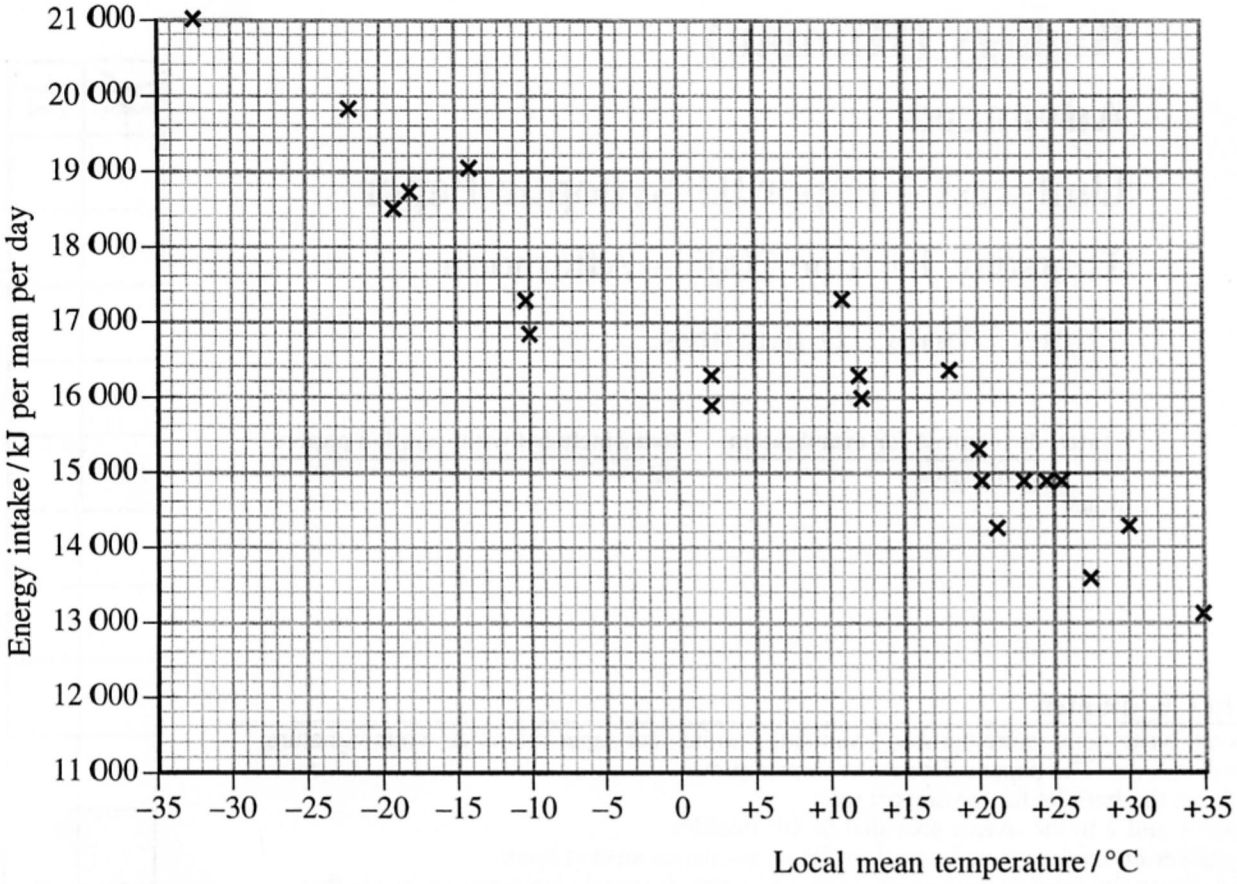
Success through qualifications

Answer Questions 1 and 2 in the spaces provided.

Leave blank

1. Food intake in humans has been shown to be related to environmental temperature.

The scattergraph below shows how the voluntary energy intake of soldiers stationed in different climates varied with the local mean temperature. The energy intake was measured in kJ per man per day.



(a) On the graph, draw a line of best fit through the data.

(1)

(b) Describe the trend shown by the data.

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(2)

(c) Suggest an explanation for the trend shown by the data.

Leave blank

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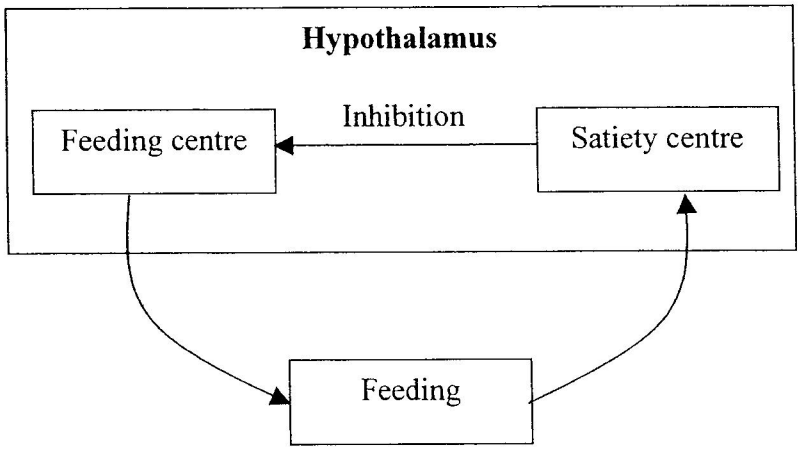
(2)

(d) There is some evidence to suggest that the hypothalamus is involved in the voluntary regulation of food intake in mammals.

The diagram below shows two opposing control centres in the hypothalamus and their links with feeding. Stimulation of the 'feeding centre' promotes feeding, which is inhibited if the 'satiety centre' is stimulated.



(i) What name is given to this type of homeostatic control mechanism?

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(1)

(ii) Many research workers consider that the signals which stimulate the satiety centre to inhibit feeding could be chemical.

Explain how, as a result of eating a meal rich in starch, the satiety centre could be chemically activated to inhibit feeding.

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(2)

(iii) Suggest one other chemical, linked with levels of glucose in the blood, that could stimulate the satiety centre. Give reasons for your answer.

Leave blank

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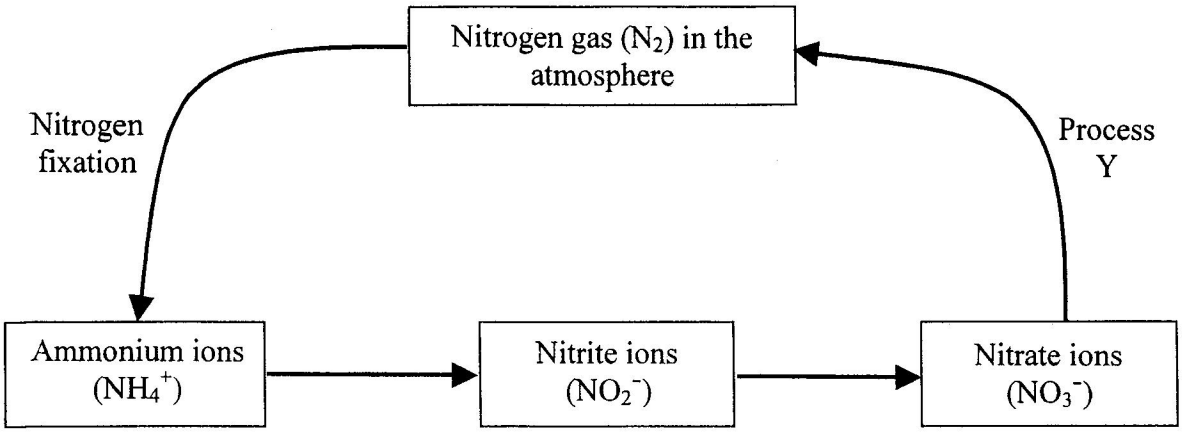
(3)

Q1

(Total 11 marks)

2. The diagram below represents some of the stages in the nitrogen cycle.

Leave blank



(a) (i) Name a genus of bacteria responsible for the oxidation of ammonium ions to form nitrite ions.

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(1)

(ii) Describe process Y, and explain the conditions under which it occurs.

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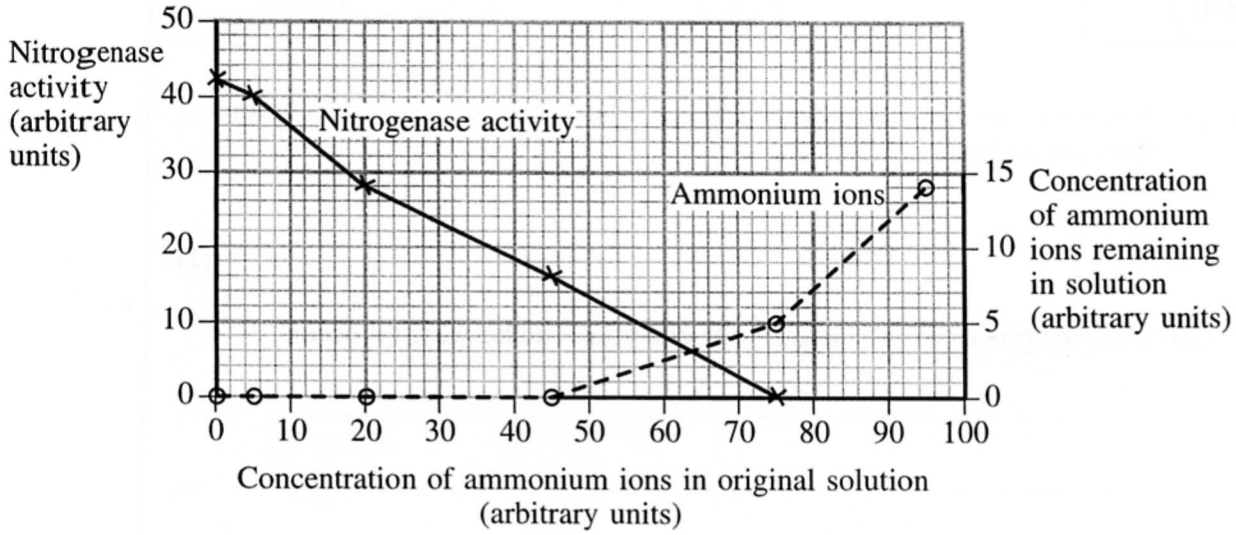
(3)

(b) The conversion of nitrogen gas to ammonium ions (NH_4^+) involves the enzyme nitrogenase.

Leave blank

In an investigation of nitrogenase activity in the nitrogen-fixing bacterium *Azotobacter chroococcum*, cultures of the bacterium were grown in a solution containing different concentrations of ammonium chloride. Nitrogenase activity was measured at each concentration, in arbitrary units. The concentration of ammonium ions remaining after the bacterial cells had been removed was determined.

The results are shown in the graph below.



(i) Describe the relationship between nitrogenase activity and the concentration of ammonium ions in the original solution.

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(2)

(ii) Using all the information available and your knowledge of the factors affecting enzyme activity, suggest explanations for the relationship you have described.

Leave blank

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(4)

(c) Explain why it could be advantageous to incorporate genes for nitrogen fixation into crop plants such as cereals.

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(2)

Q2

(Total 12 marks)

The essay questions are on the next page

Write an essay on ONE of the following topics.

Leave blank

For Biology you should choose EITHER Question 3 OR Question 4B.

For Biology (Human) you should choose EITHER Question 3 OR Question 5H.

3. The structure of enzymes and their uses in commercial processes.

(Total 15 marks)

4B. The structure and functions of chloroplasts and mitochondria.

(Total 15 marks)

5H. Fertilisation in humans and the detection of fetal abnormalities.

(Total 15 marks)

Write your essay in a separate answer book. Complete all of the details on the front cover of the answer book and fasten it loosely but securely inside this booklet.

Marks will be awarded for scientific content, coverage of the topic, and the quality of written communication. You should include in your answers any relevant information from the whole of your course. You may include diagrams if you wish, but make sure that they are relevant to your essay and add extra information to it.

TOTAL FOR PAPER: 38 MARKS

END

Do not write in this space