Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	1	0	3	/	0	3	Signature	

Paper Reference(s)

6103/03

Edexcel GCE

Biology

Biology (Human)

Advanced Subsidiary

Unit 3 Paper 03

Monday 5 June 2006 – Morning

Time: 1 hour

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
Total	

Materials required for examination
Ruler

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
The paper reference is shown above. Check that you have the correct question paper.
Answer ALL THREE questions in the spaces provided in 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 question 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.

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Answer ALL questions in the spaces provided.

1. Describe how each of the following organisms obtains the amino acids that it uses to synthesise proteins.

(a) *Rhizopus* sp.

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(2)

(b) *Rhizobium* sp.

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(2)

(c) *Taenia* sp.

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(2) **Q1**

(Total 6 marks)

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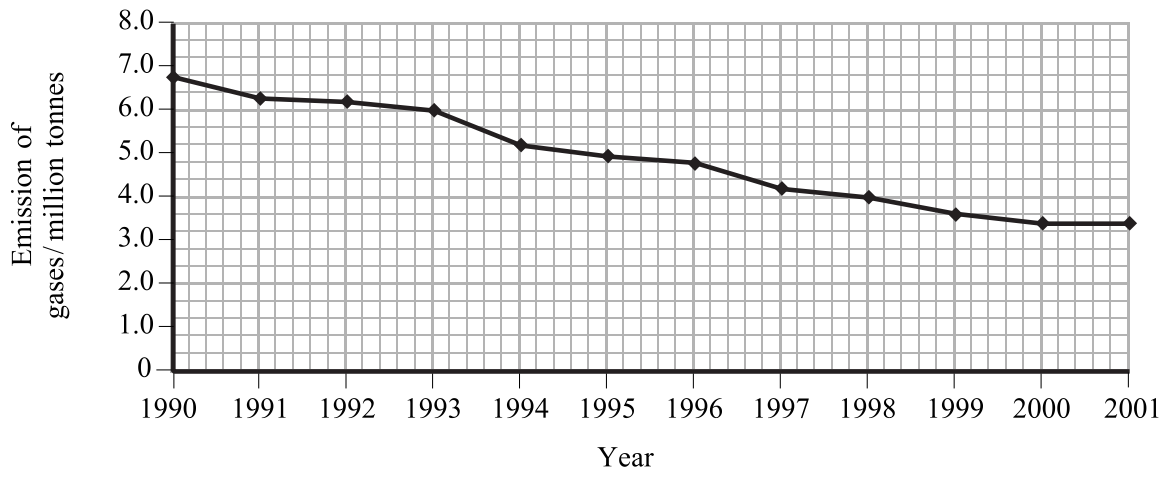
2. Some of the gases emitted as waste products of the combustion of fossil fuels can contribute to the formation of acid rain. Acid rain may fall many hundreds of kilometres away from the original source of these waste gases, where it can have serious effects on the organisms in these regions.

During the late 20th century the emission of gases that contribute to the formation of acid rain decreased in the United Kingdom. Figure 1 shows the decrease in the emission of gases from 1990 to 2001 in million tonnes.

Figure 1



One of the effects of acid rain is the increase in concentration of certain metal ions in aquatic habitats. Rainbow trout are fish found living in the rivers of the UK. Figure 2 shows the effect of low pH and dissolved aluminium (Al) ions on the mortality (death) of rainbow trout larvae. The percentage mortality of the larvae was recorded during a 30-day exposure to various conditions.

(a) (i) Explain how gases such as sulphur dioxide, emitted as waste products of the combustion of fossil fuels, can cause acid rain.

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(2)

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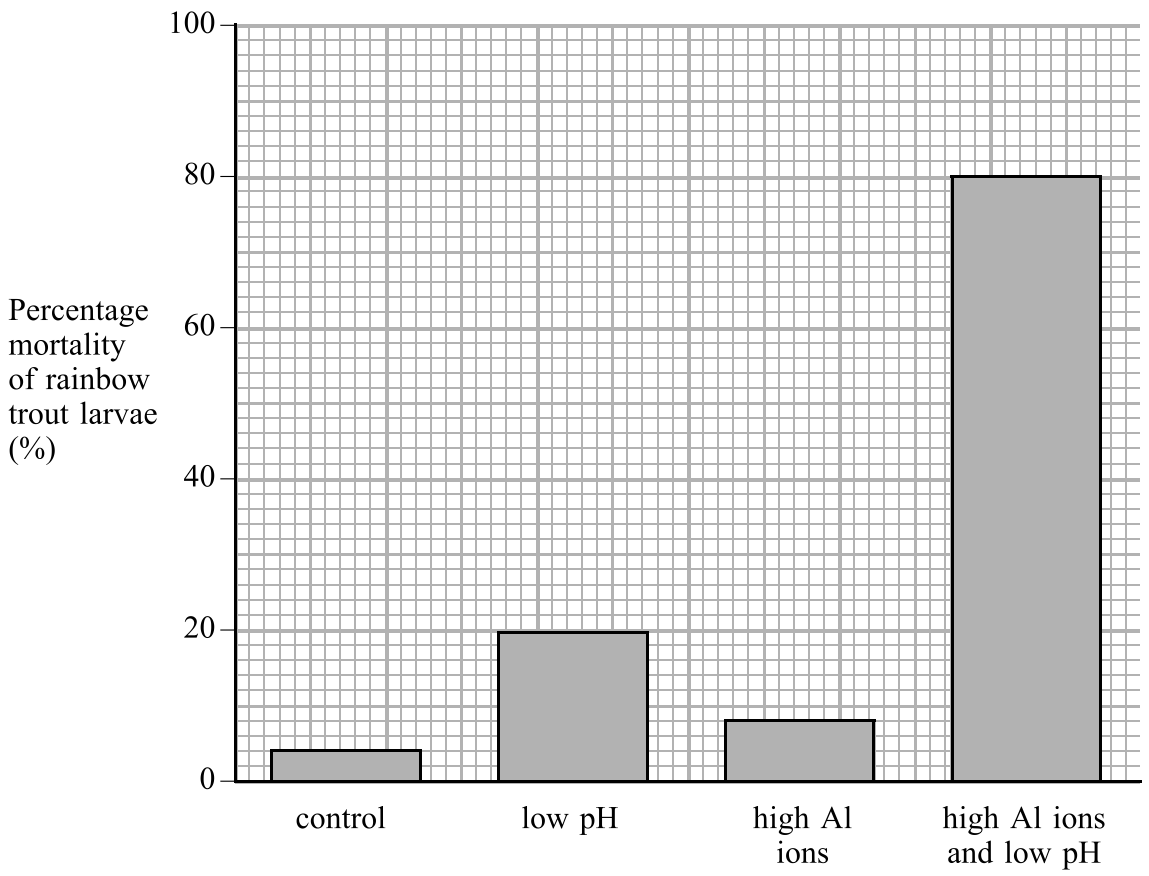
Figure 2



(ii) Using the information in Figure 1, calculate the percentage decrease in the total emission of gases between 1990 and 2001. Show your working.

Answer .....%

(3)

(iii) Give **two** reasons why the emission of gases that cause acid rain decreased between 1990 and 2001.

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(2)

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(b) Using Figure 2, describe the effect of aluminium ions and low pH on the percentage mortality of rainbow trout larvae.

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(c) Herons, a type of bird, feed on a variety of small vertebrates such as fish, frogs and toads. Using the information in Figure 2, suggest and explain how herons might be affected in areas where acid rain falls.

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Q2

(Total 14 marks)

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3. The periwinkle (*Littorina littorea*) is a small marine snail that feeds on algae (seaweeds) as shown in Figure 1 below. It prefers to eat fast-growing, short-lived green algae such as *Enteromorpha* rather than tough, long-lived red algae such as *Chondrus*.

Figure 1

Periwinkle (*Littorina littorea*) feeding on algae.

If these two algae are growing in the same rock pool, the more rapid growth of *Enteromorpha* reduces the growth of *Chondrus*. However, periwinkles grazing on the *Enteromorpha* help to keep it under control and this allows *Chondrus* to grow.

A study was made of the feeding preferences of the periwinkle on rocky shores and how these affected the growth of *Enteromorpha* and *Chondrus*. An ecologist studied the percentage cover of algae in three rock pools.

The density of periwinkles in the three rock pools was:

- Rock pool A 100 per m^2
- Rock pool B 200 per m^2
- Rock pool C 0 per m^2

At the start of the study she removed all of the periwinkles from Rock pool B and placed them in Rock pool C which had none. She monitored the changes in the percentage cover of algae over a period of 28 months. Her results are shown in Figure 2. The effect of the density of the periwinkles on the diversity of the algae was also studied. The results are shown in Figure 3.

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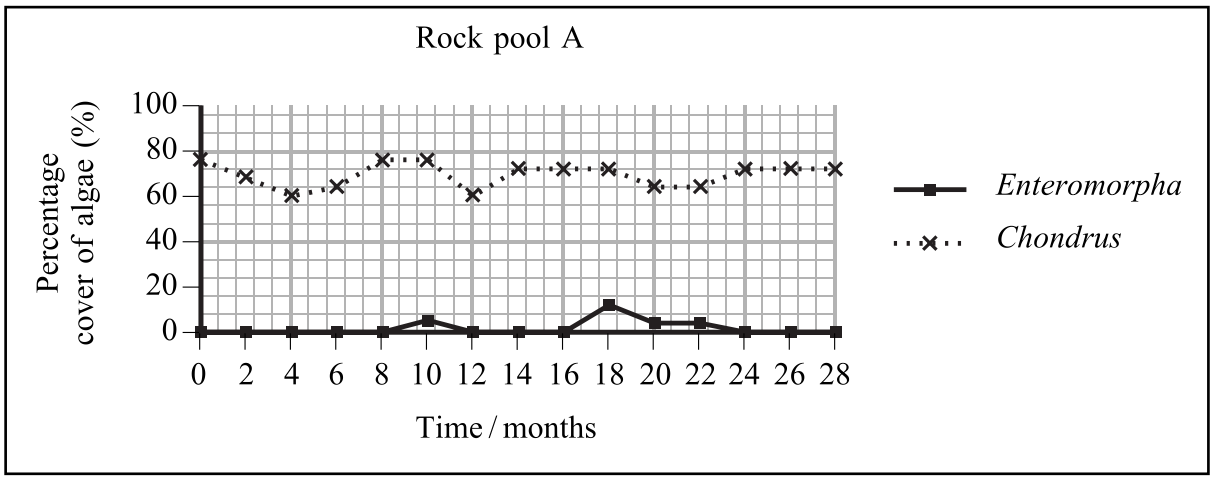
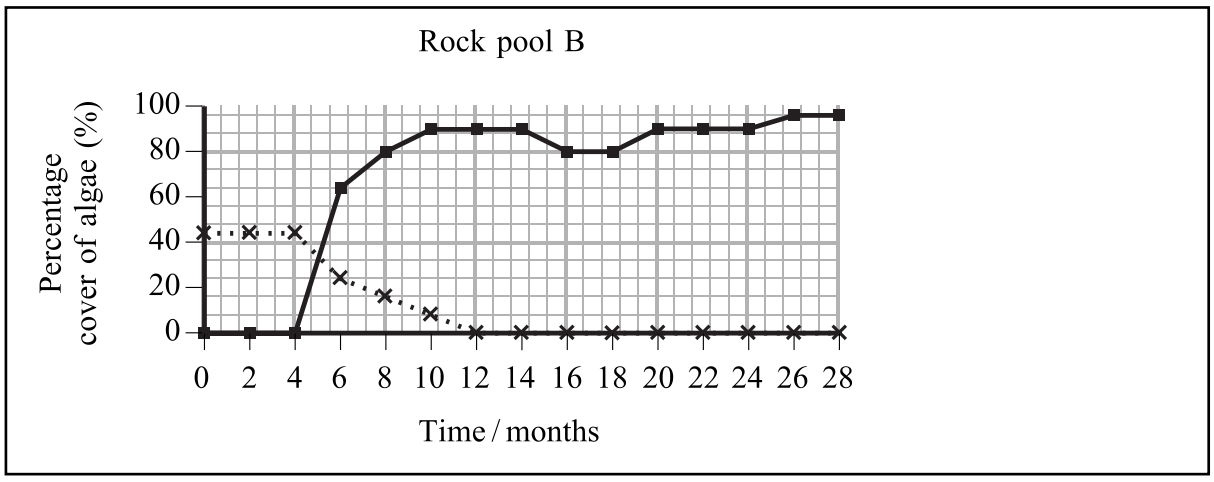
Figure 2





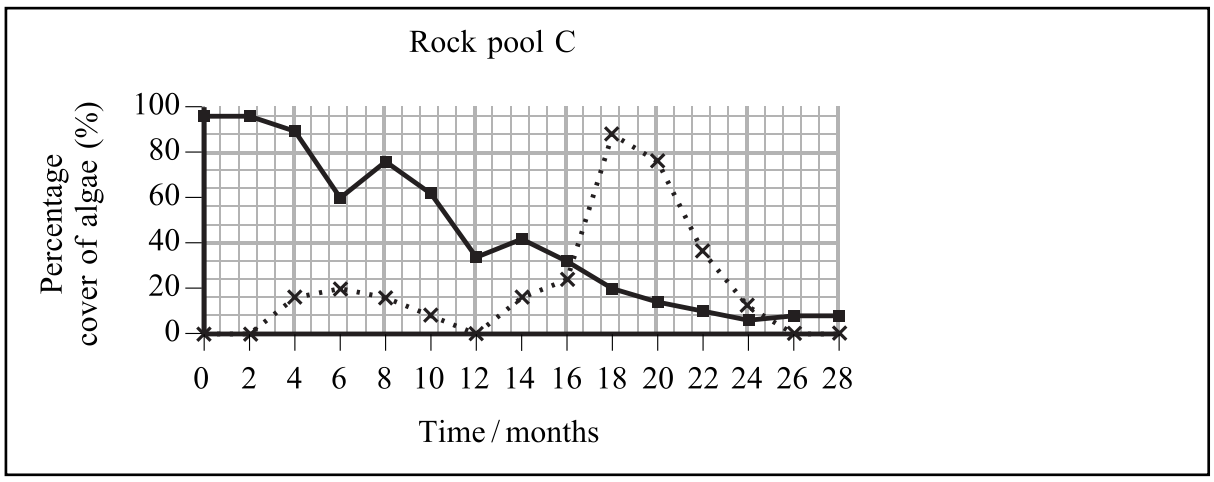


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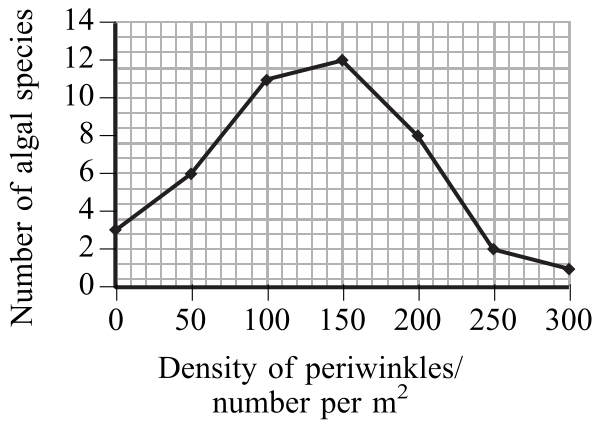
Figure 3

Graph showing the change in the number of algal species with the increase in the density of periwinkles in rock pools



(a) State the terms that are used to describe the roles of the algae and periwinkles in a food chain.

Algae .....

Periwinkles .....

(2)

(b) (i) Using Figure 2, describe the percentage cover of *Enteromorpha* and *Chondrus* in Rock pools B and C at the start of the study (Month 0).

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(ii) Describe the changes in the percentage cover of *Enteromorpha* in Rock pools A, B and C.

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(iii) Suggest reasons for these changes described in (b)(ii).

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(iv) Suggest a reason for the sudden fall in the percentage cover of *Chondrus* in rock pool C after 18 months.

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(c) Using Figure 3, describe and explain the effect of periwinkle density on the number of algal species.

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(d) Rock pools can be polluted by excess nutrients.

(i) Give **two** sources of excess nutrients.

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(ii) Describe the effect of excess nutrients on aquatic habitats.

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(4) **Q3**

(Total 18 marks)

TOTAL FOR PAPER: 38 MARKS

END