Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	1	1	5	/	0	1	Signature	

Paper Reference(s)

6115/01

Edexcel GCE

Biology (Human)

Advanced

Unit 5H

Tuesday 19 June 2007 – Morning

Time: 1 hour 30 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
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 SEVEN 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 70.

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.
The Synoptic section (Questions 4 to 7) 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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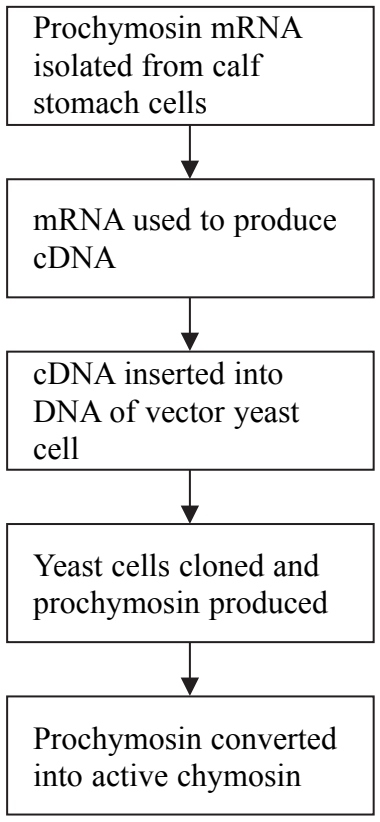
Answer ALL questions in the spaces provided.

1. One of the first stages in the production of cheese is the coagulation (clotting) of the milk protein, casein, which is brought about by the enzyme, chymosin.

The diagram below shows some of the main stages in the production of chymosin using yeast cells.



(a) Cheese produced using chymosin cultured from yeast cells is acceptable to most vegetarians. Suggest why some consumers may still have concerns about eating cheese prepared in this way.

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(1)

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(b) With reference to the diagram opposite, explain how enzymes are used in the production of chymosin using yeast cells.

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(4)

Q1

(Total 5 marks)

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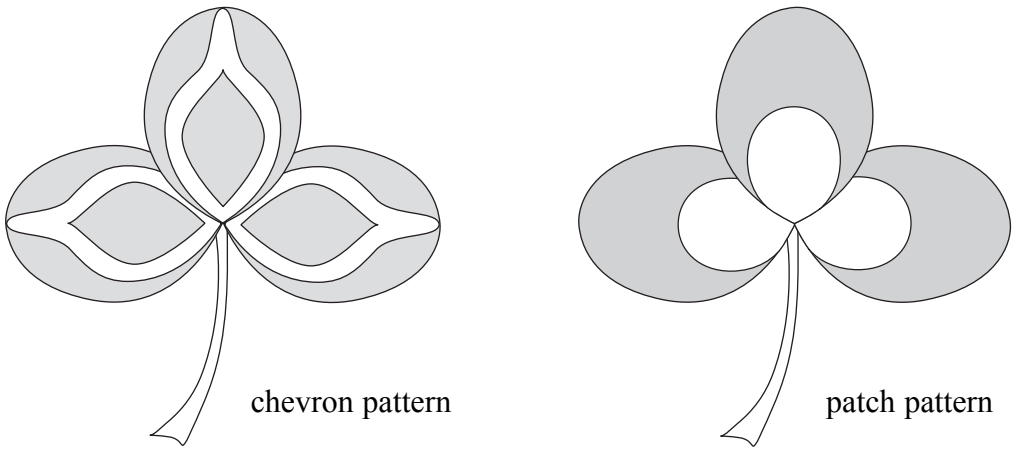
2. (a) The white clover, *Trifolium repens*, is one of the plants found growing as a weed in many lawns.

Leaves of the white clover are divided into three leaflets which often have characteristic white patterns visible on their surface. The two basic forms of the pattern are a chevron and a large patch. The diagram below shows these two patterns.

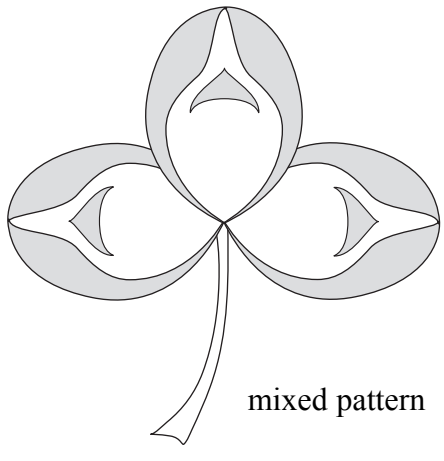


chevron pattern

patch pattern

The basic form of the white pattern is governed by a single gene, **V**. Plants homozygous for the allele $\mathbf{V^C}$ will have the chevron pattern. Plants homozygous for the allele $\mathbf{V^P}$ will have the patch pattern.

If a clover plant with the chevron pattern is crossed with a plant with the patch pattern, the offspring have leaflets with a mixed chevron and patch pattern, as shown in the diagram below.



mixed pattern

(i) State the term used to describe the form of inheritance, shown in white clover, where the heterozygote offspring show the mixed pattern on their leaflets.

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(1)

Leave blank

A cross between two white clover plants, each with the mixed pattern, was carried out.

(ii) State the expected ratio of the phenotypes in the offspring of this cross.

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(1)

(iii) In the space below, draw a genetic diagram to show how this expected ratio was achieved.

(3)

(b) The ABO blood grouping in humans is governed by three alleles $\mathbf{I^A}$, $\mathbf{I^B}$ and $\mathbf{I^O}$. The four phenotypic blood groups for this system are A, B, AB and O.

With reference to both similarities and differences, compare the inheritance of ABO blood groups in humans with the inheritance of leaflet patterns in white clover.

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(4) **Q2**

(Total 9 marks)

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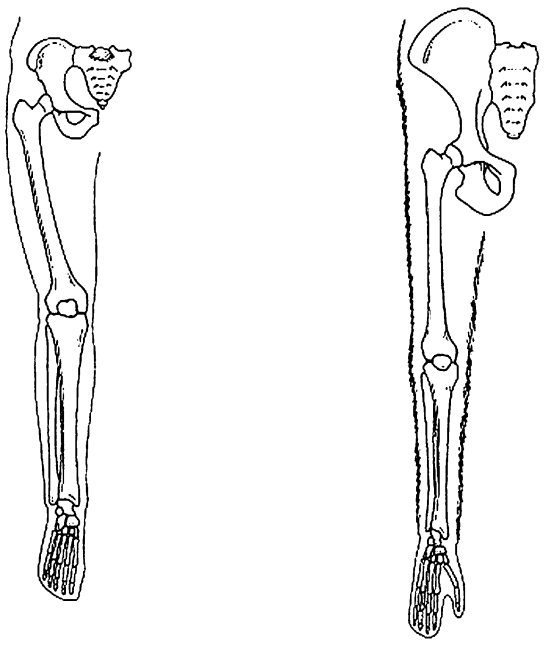
3. The diagrams below show the bones in the foot, leg and hip of a human and a gorilla.



human gorilla

(a) (i) For both the human and the gorilla, describe how the foot is adapted to their mode of walking.

Human

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(2)

Gorilla

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(2)

Leave blank

(ii) Describe how the shape and arrangement of the hip and leg bones of a human differ from those of a gorilla.

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(4)

(b) Describe **two** advantages of having the hands free while walking.

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(2)

Q3

(Total 10 marks)

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Synoptic Section

The questions in this section are designed to give you the opportunity to make connections between different areas of biology and to use skills and ideas developed thoughout the course in new contexts. You should include in your answers any relevant information from the whole of your course.

4. (a) Adipose tissue contains stored triglycerides. Describe the structure of a **triglyceride**.

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(3)

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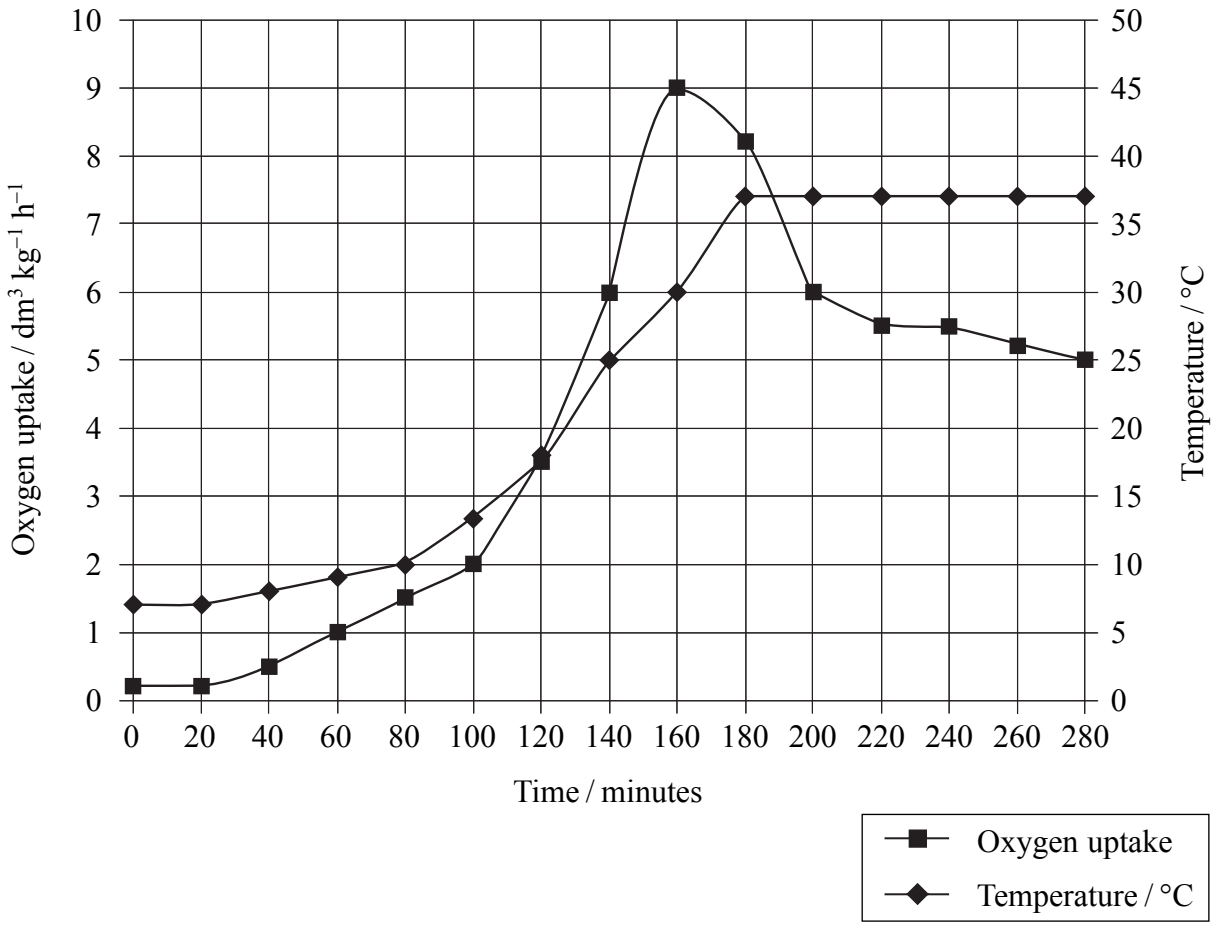
(b) When a hamster hibernates, its body temperature falls below 10 °C and its breathing and heart rate slow down. The animal goes into a 'deep sleep' over winter. At the end of hibernation, its body temperature must increase rapidly to wake the animal up.

Hibernating mammals have special adipose tissue known as 'brown fat'. This tissue is usually found between the shoulder blades. Brown fat behaves differently from normal adipose tissue. When brown fat tissue is actively metabolising, it generates a lot of heat and this is used to warm the body.

The graph below shows the changes in temperature and oxygen uptake of a hamster coming out of hibernation.



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Using the information in the graph, explain how the metabolism of brown fat could have caused the changes in body temperature and oxygen uptake of the hamster.

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(6)

(c) Describe **three** other uses of triglycerides in the body of a mammal.

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(3)

Q4

(Total 12 marks)

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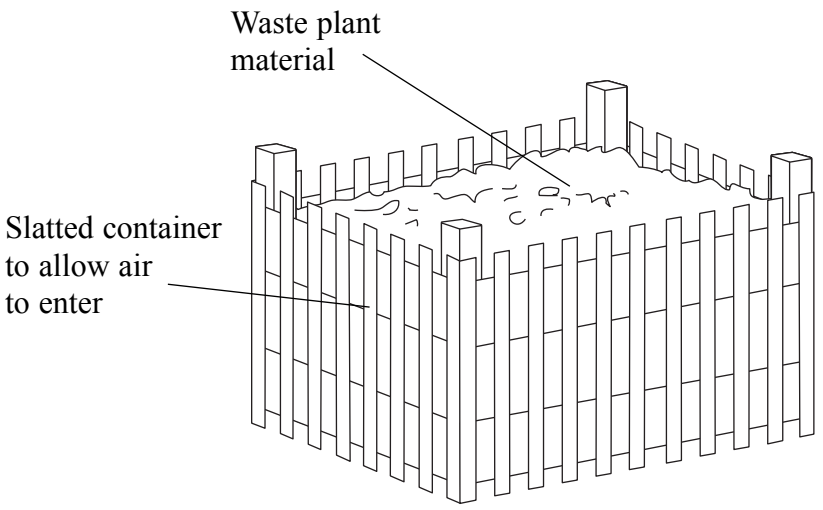
5. Compost is usually produced from waste plant material by the action of aerobic microorganisms. It consists mainly of decomposed organic material that is rich in minerals such as nitrates. A variety of plant material, such as grass cuttings, fallen leaves and vegetable waste, can be used to produce compost.

The rate of production of compost depends on several factors such as temperature, moisture content and aeration.

The diagram below shows a container used for producing compost.



(a) Explain how nitrates are produced from the waste plant material.

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(b) Suggest and explain why compost containers should not be placed close to streams.

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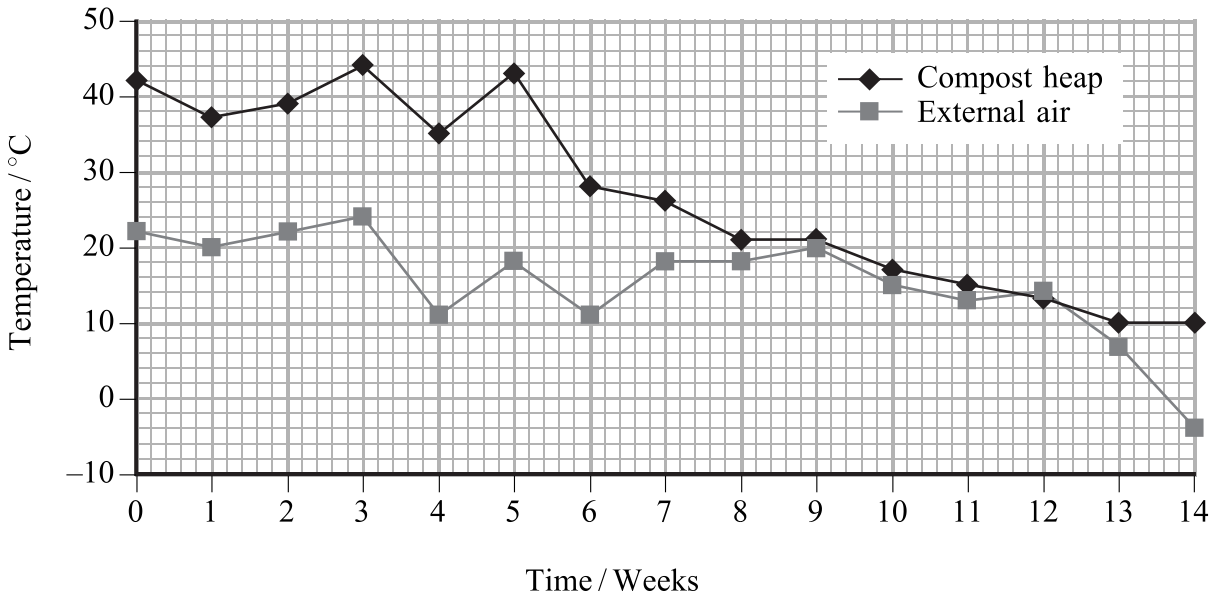
(3)

(c) An investigation into the relationship between the temperature in a compost heap and the external air temperature was carried out. A container was filled with waste plant material. After 8 weeks, measurements of the temperature in the centre of the compost and the external air temperature were taken each week. The results of this investigation are shown on the graph below.



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(i) Compare the temperature in the compost with the temperature of the external air in the first six weeks.

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(2)

(ii) Suggest reasons for the differences in the two temperatures in the first six weeks.

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(2)

(iii) The temperature of the compost falls between week 9 and week 14. Suggest how changes in factors, other than external air temperature, may have contributed to this fall in temperature.

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(2)

Q5

(Total 12 marks)

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6. The distribution of organisms within a habitat or on a world-wide scale is influenced by both biotic and abiotic factors.

(a) Explain what is meant by the terms **biotic** and **abiotic** factors.

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(1)

(b) For a particular habitat that you have studied, describe **one** technique which you used to investigate how a specific abiotic factor affected the distribution of a **named** organism. (*The results of your investigation are not required.*)

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(c) Human populations that inhabit regions of the world with extreme environmental conditions often show special adaptations suited to these conditions.

In a study, blood samples were taken from four populations living in different regions, the Andes, Ethiopia, Tibet and the USA. The samples were analysed to find the percentage saturation of oxygen in the blood.

Figure 1 shows the mean height above sea level of the four regions. Figure 2 shows the results of the blood sampling.

Figure 1 – Regions and mean height above sea level

Region	Mean height above sea level / m
Andes	4000
Ethiopia	4000
Tibet	4000
USA	0

Figure 2 – Percentage of the population with greater than 95% oxygen saturation in their blood

Region	% population with greater than 95% oxygen saturation in blood
Andes	16
Ethiopia	52
Tibet	6
USA	50

(i) Explain why living at high altitude may affect the percentage oxygen saturation of the blood.

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(2)

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(ii) Explain what the data suggest about which populations have developed adaptations to high altitude living.

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(d) Suggest **three** possible adaptations that would improve the percentage oxygen saturation of the blood at high altitudes.

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(Total 11 marks)

Q6

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7. (a) Explain what is meant by the term **global warming**.

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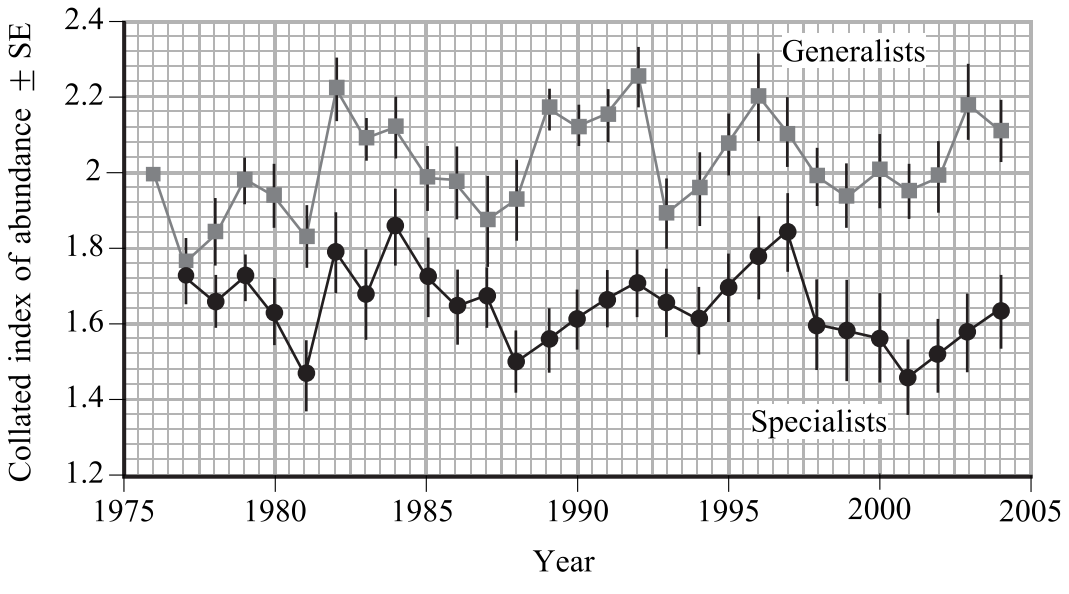
(3)

(b) In 1976, a scheme was set up to record the distribution and abundance of butterflies in the United Kingdom. The records show that the abundance and distribution of many species of butterfly have changed. The graph below shows the changes in the abundance of two groups of butterflies. The generalists are butterflies found in a wide range of habitats, while the specialists are butterflies found only in certain types of habitat.



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(i) Compare the trends and patterns of the abundance of the two groups of butterflies shown in the graph.

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(2)

(ii) Suggest reasons for the changes that you have described in (b)(i).

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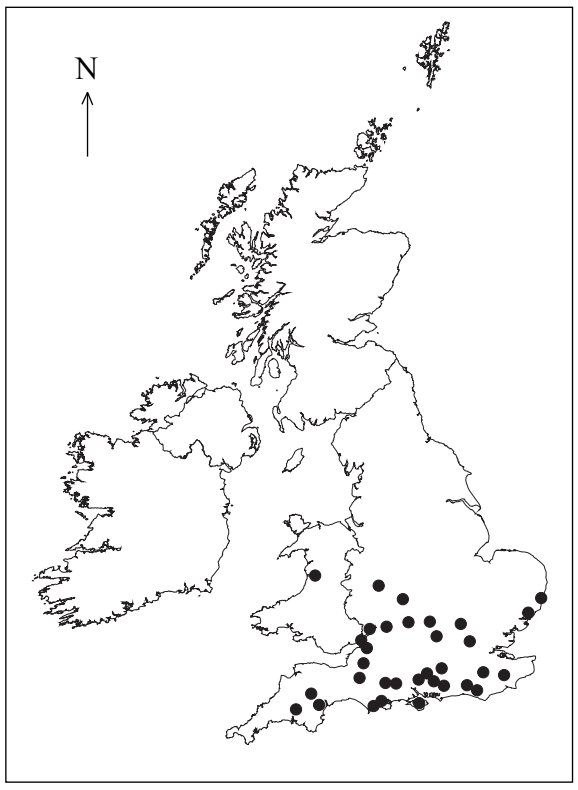
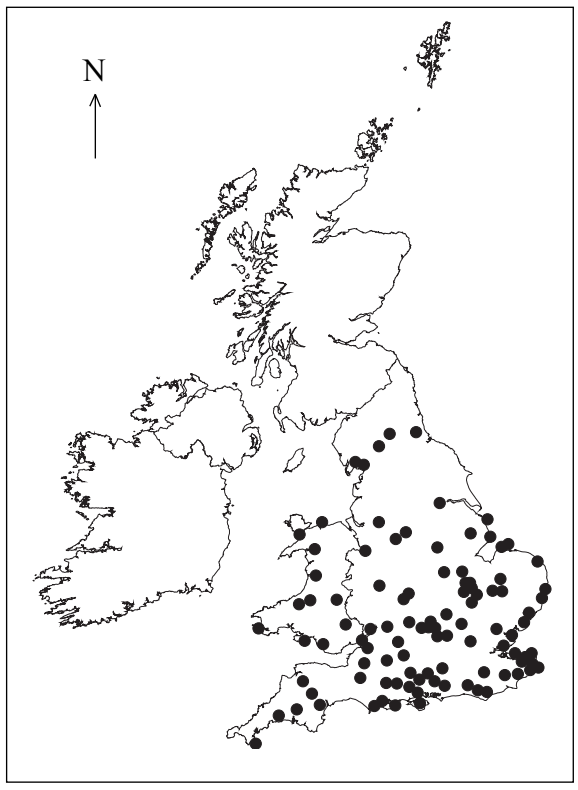
(c) The distribution of the Comma butterfly (shown below) has altered considerably since 1982. This butterfly has expanded its range northwards more than any other British species of butterfly.

The dots on the maps indicate places where the Comma butterfly was recorded.



1982



2000

Leave blank

Suggest how global warming could affect the distribution of the Comma butterfly.

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(3)

Q7

(Total 11 marks)

TOTAL FOR PAPER: 70 MARKS

END