Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

Leave blank

General Certificate of Education
June 2006
Advanced Subsidiary Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

ENVIRONMENTAL SCIENCE **ESC3**
Unit 3 The Biosphere

Thursday 8 June 2006 1.30 pm to 2.30 pm

You will need no other materials.
You may use a calculator.

Time allowed: 1 hour

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

- The maximum mark for this paper is 60.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English, clear presentation and appropriate use of specialist vocabulary. Question 6 should be answered in continuous prose. Quality of Written Communication will be assessed in this answer.

For Examiner's Use			
Number	Mark	Number	Mark
1		5	
2		6	
3			
4			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

There are no questions printed on this page

Answer **all** questions in the spaces provided.

1 (a) Complete the table by selecting the appropriate letter from the list below.

A environmental resistance
B population density
C biotic potential
D carrying capacity
E intraspecific competition
F interspecific competition

Definition	Letter
Competition between different species for resources such as food and space	
The maximum reproductive capacity of a population with unlimited resources	
The sum total of factors that reduce the growth of a population, including predation, disease, competition and unfavourable climate	

(3 marks)

(b) Population size is regulated by both density dependent and density independent factors. Using an example, explain the meaning of a *density independent factor*.

.....

.....

.....

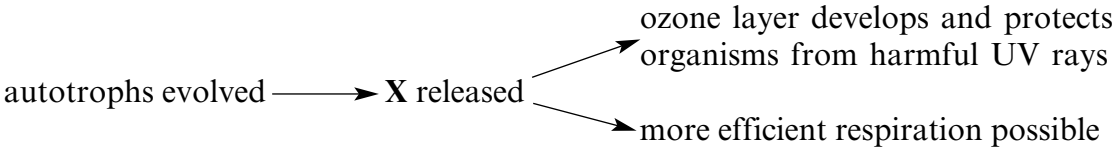
.....

(2 marks)

5

Turn over ►

2 (a) The diagram shows some of the early stages in the development of life on Earth.



(i) What gas is represented by **X**?

.....

(1 mark)

(ii) Explain why *more efficient respiration* was possible.

.....

.....

.....

.....

(2 marks)

(iii) Explain why ultraviolet (UV) radiation is harmful to organisms.

.....

.....

(1 mark)

(iv) Other than suitable ambient gases and types of radiation, state and explain **one** other condition on Earth that permits the existence and continued support of living organisms.

Condition .....

Explanation .....

.....

(2 marks)

(b) Decomposers such as bacteria and fungi are essential for the continuation of life on Earth.

(i) Outline the role of decomposers in soil.

.....

.....

.....

.....

.....

.....

(3 marks)

(ii) Explain why the process of decomposition is slowed down in heavily compacted soils.

.....

.....

(1 mark)

10

Turn over for the next question

3 Lowland heaths are ecosystems dominated by heather plants. Since 1800, 84 % of lowland heaths in the UK have been lost due to human activity.

(a) Suggest how human activity may have led to the decline of lowland heaths.

.....

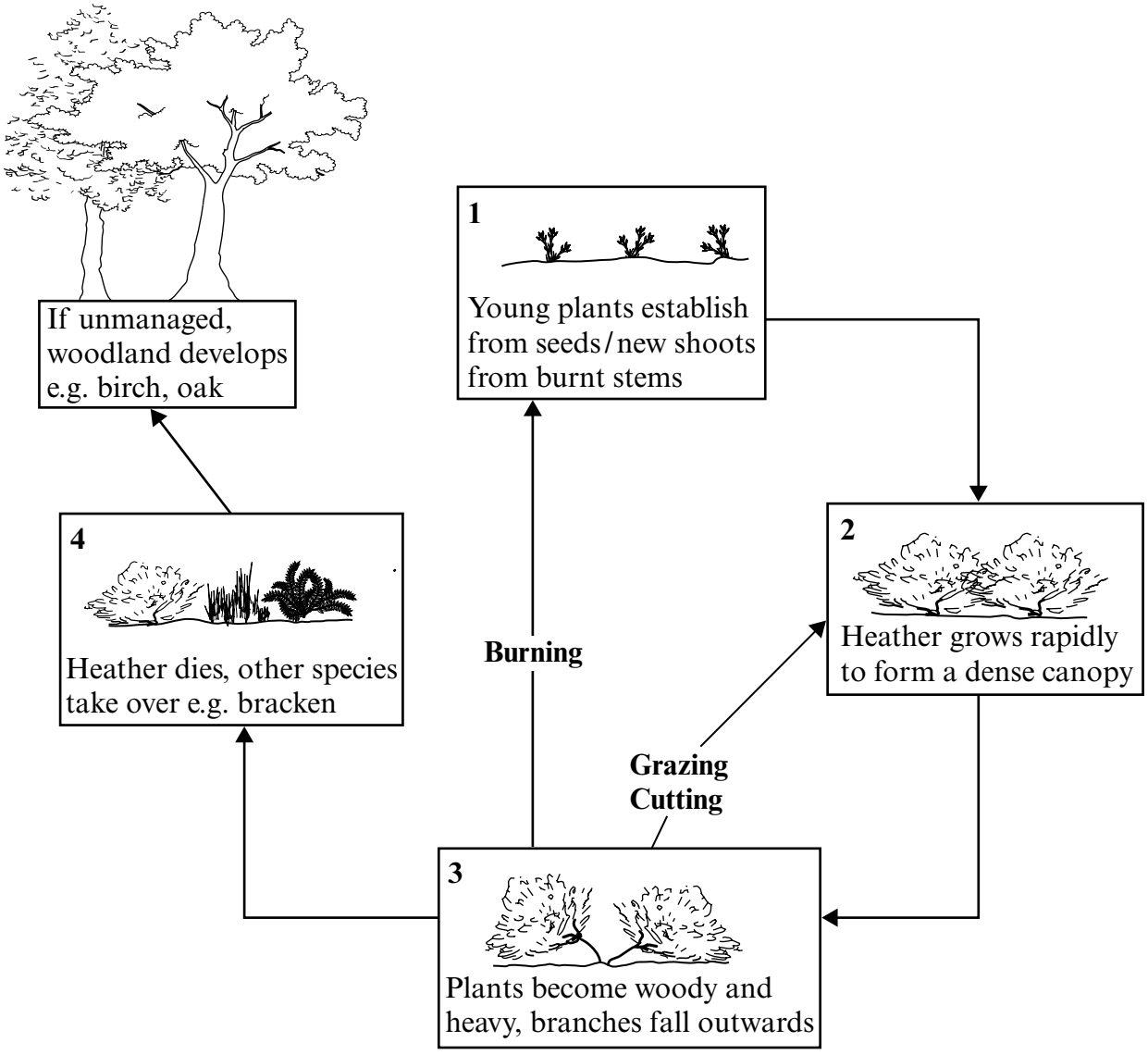
.....

.....

.....

(2 marks)

(b) Heather has a life cycle divided into four stages. The diagram shows how the heather cycle is managed.



What term describes:

(i) the final stage in succession where mature oak woodland is established;

.....

(1 mark)

(ii) the heathland community maintained by grazing, cutting or burning?

.....

(1 mark)

(c) In areas where heather is managed for sheep grazing, it is burnt every few years to encourage new growth.

(i) Suggest why the burning of heather may increase the food available to the sheep.

.....

.....

(1 mark)

(ii) After burning, the heath regenerates in a process called secondary succession. Suggest why secondary succession results in the rapid re-establishment of plant and animal populations.

.....

.....

.....

.....

.....

(3 marks)

(d) Suggest **two** ways in which governments or local authorities can aid the conservation of lowland heaths.

1. .....

.....

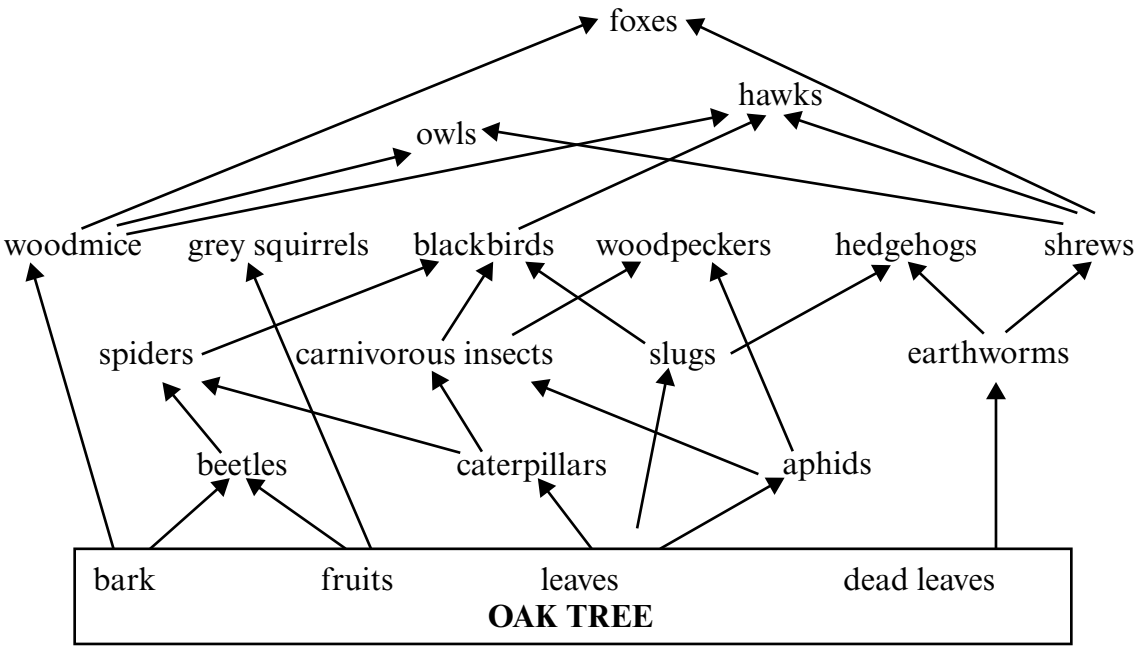
2. .....

.....

(2 marks)

10

4 The diagram shows part of a food web for oak woodland.



(a) Using the diagram, name an organism which is:

(i) a primary consumer; .....
(1 mark)

(ii) both a secondary and a tertiary consumer. .....
(1 mark)

(b) Explain:

(i) how energy from the sun is passed through the food web;

.....

.....

.....

.....

.....

.....
(3 marks)

(ii) why less energy is available at each successive trophic level.

.....

.....

.....

.....

.....

.....

(3 marks)

(c) For the first three trophic levels in the woodland ecosystem, draw a labelled sketch to show the shape of:

(i) a pyramid of numbers;

(1 mark)

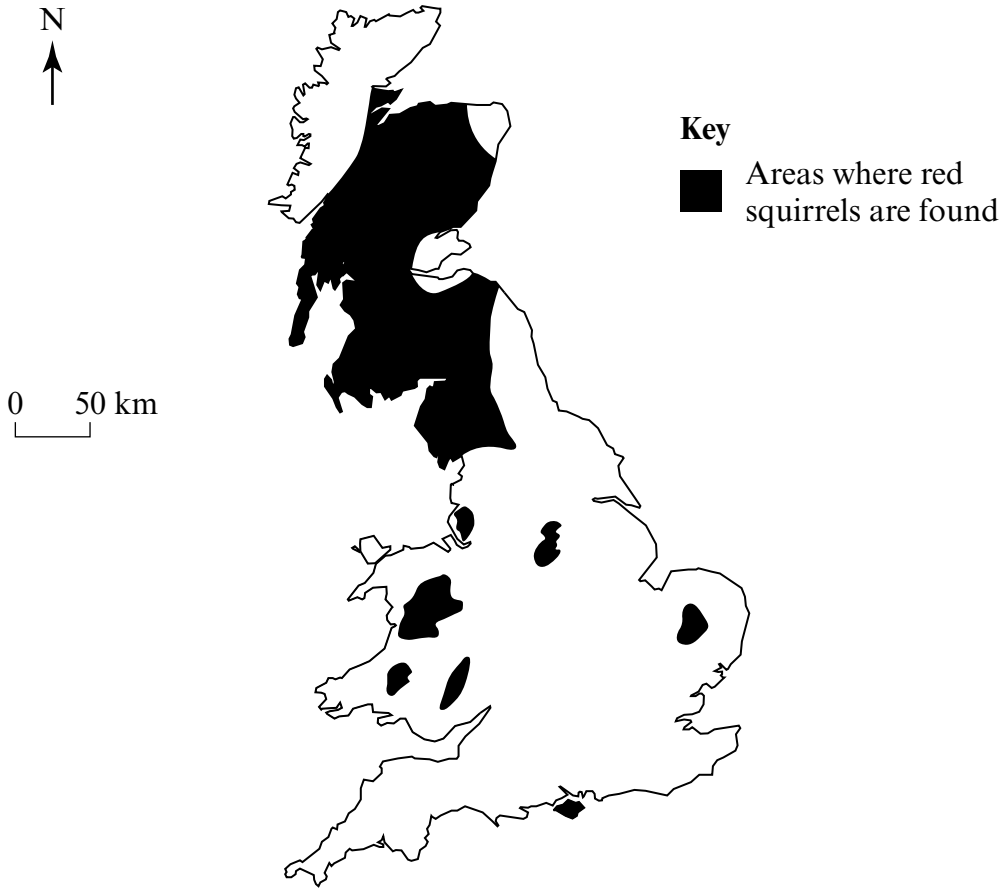
(ii) a pyramid of biomass.

(1 mark)

10

5 The map shows the present distribution of the red squirrel, a native British species. Before the introduction of grey squirrels into Britain from North America in 1872, red squirrels were found throughout Great Britain.

Population in 2004	
Red squirrels	160 000
Grey squirrels	2 500 000



(a) Suggest **three** reasons for the decline in the red squirrel population.

1. .....

.....

2. .....

.....

3. .....

.....

(3 marks)

(b) In some parts of the country, the population of red squirrels is stable or even increasing. This is because the red squirrels are exploiting a different ecological niche from grey squirrels.

Explain the significance of the *different ecological niche*.

.....

.....

.....

.....

(2 marks)

(c) Describe the methods used for the conservation of endangered animal species.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(5 marks)

10

6 Hedgerows are a prominent feature of the UK countryside and are an important habitat for wildlife.

(a) Suggest why hedgerows are important for wildlife.

.....

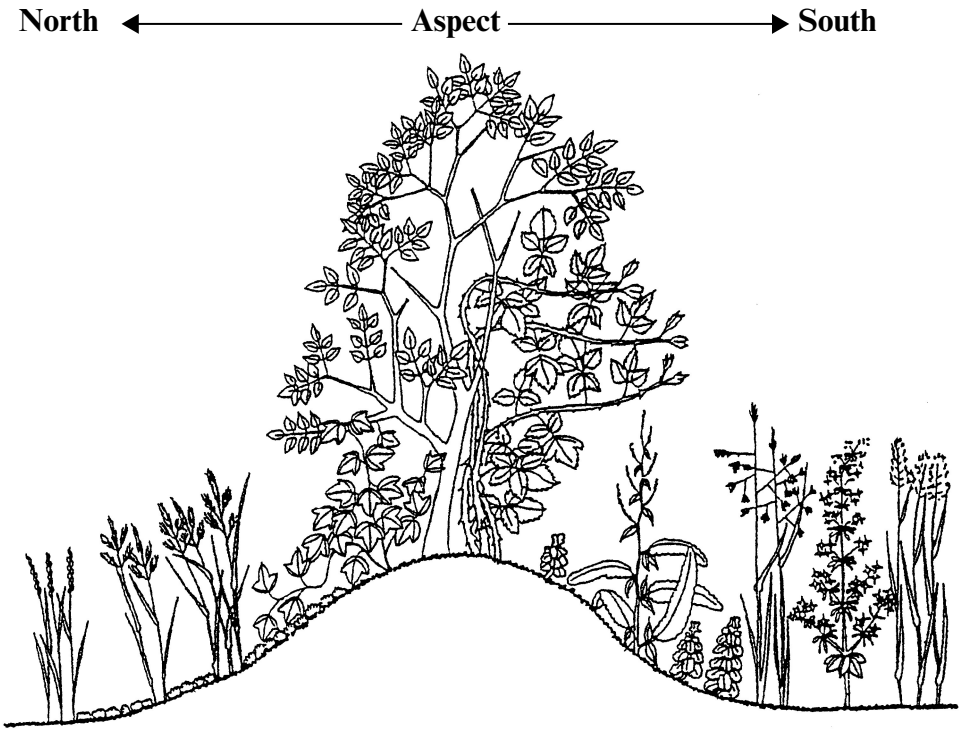
.....

.....

.....

(2 marks)

(b) The diagram shows a cross-section of a typical hedge.



A student used a belt transect to test the hypothesis that the types of plant growing on the north side of the hedge were different from those on the south side.

(i) Explain why a belt transect was an appropriate method to use for this study.

.....

.....

(1 mark)

(ii) Describe how a belt transect would have been carried out to test this hypothesis.

.....

.....

.....

.....

.....

.....

(3 marks)

(c) Describe methods by which the numbers and distribution of animal populations living in the hedgerow and surrounding fields could be investigated.

Quality of Written Communication will be assessed in this answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(9 marks)

15

END OF QUESTIONS

There are no questions printed on this page

There are no questions printed on this page