Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

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General Certificate of Education
January 2005
Advanced Subsidiary Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

ENVIRONMENTAL SCIENCE ESC2
Unit 2 The Lithosphere

Tuesday 11 January 2005 Afternoon Session

No additional materials are required.
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 in the spaces provided. All working must be shown.
- 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.
- Mark allocations are shown in brackets.
- You will be assessed on your ability to use an appropriate form and style of writing, to organise relevant information clearly and coherently, and to use specialist vocabulary, where appropriate.
- The degree of legibility of your handwriting and the level of accuracy of your spelling, punctuation and grammar will also be taken into account.

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

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

1 Complete the table by adding the appropriate land reclamation technique or reason.

Land reclamation technique	Reason
	Increase pH to increase nutrient availability
	Increase aeration and decrease compaction
Planting legumes	
Reducing gradient of slopes to less than 20°	
Spraying grass seeds in a liquid slurry of treated manure (hydro-seeding)	

(5 marks)

5

2 (a) The table shows the size range of the mineral components of a soil.

Component	Diameter (mm)
A	< 0·002
B	0·002 – 0·049
C	0·05 – 2·00

Identify components **A**, **B** and **C**.

A .....

B .....

C .....

(3 marks)

(b) What is soil texture?

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(1 mark)

(c) Outline a technique which can be used to determine the texture of a soil.

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(2 marks)

(d) Outline how each of the following factors affects soil fertility.

pH .....

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Aeration .....

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(4 marks)

10

TURN OVER FOR THE NEXT QUESTION

3 (a) Explain what is meant by weathering.

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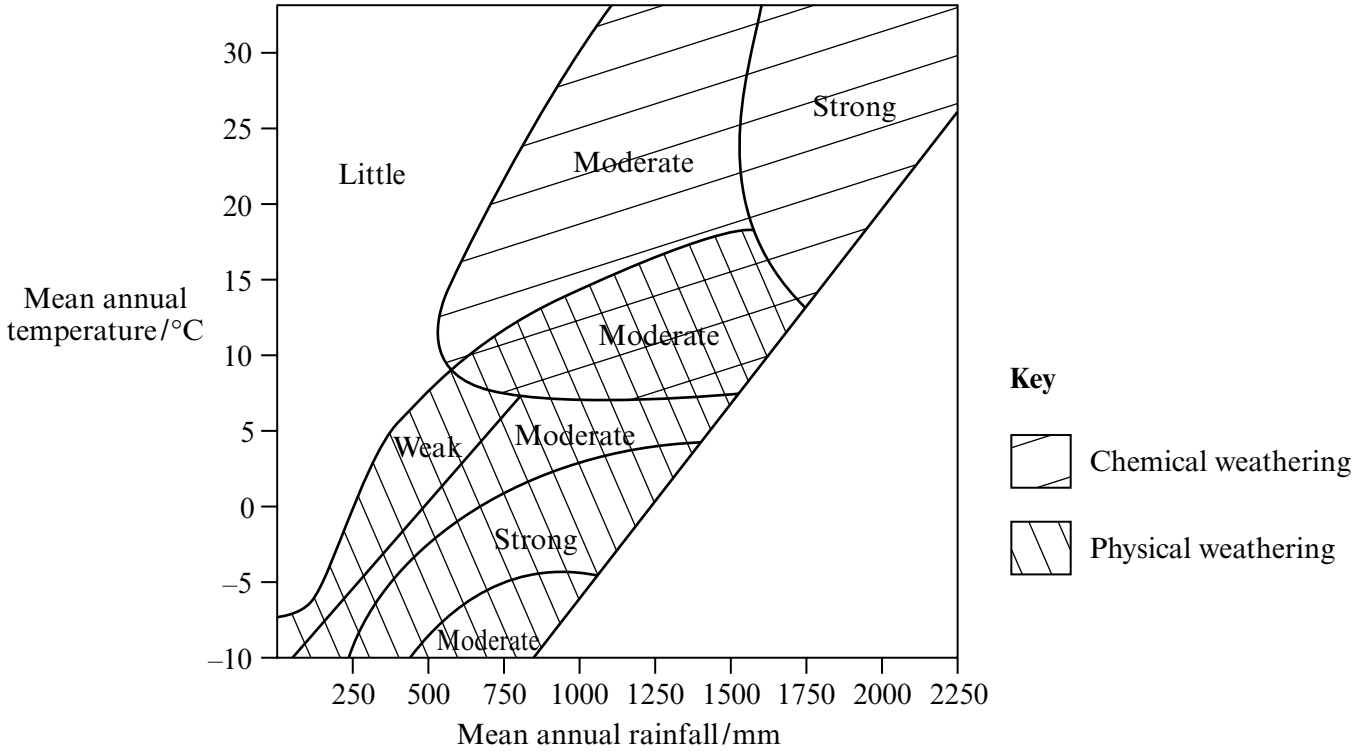
(2 marks)

(b) The graph shows the effect of temperature and rainfall on the rate of weathering.



What type of weathering occurs in:

(i) hot, wet areas;

.....

(1 mark)

(ii) areas which receive a mean annual rainfall of 1000 mm and a mean annual temperature of –2 °C?

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(1 mark)

(c) Suggest:

(i) why there is very little weathering in many deserts;

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(1 mark)

(ii) how physical weathering may increase the rate of chemical weathering.

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(2 marks)

(d) Describe the role of living organisms in weathering.

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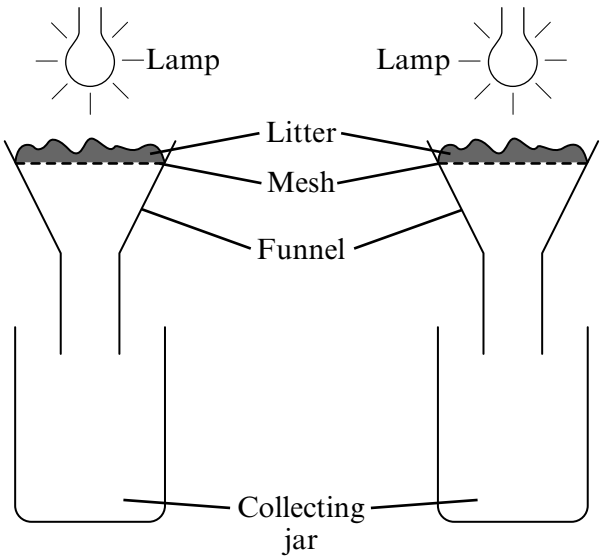
(3 marks)

10

TURN OVER FOR THE NEXT QUESTION

4 A student was investigating the invertebrate populations of litter in two woodlands, **A** and **B**.

(a) The diagram shows two Tullgren funnels which were used to extract the invertebrates. When the bulb is switched on the invertebrates move away from the heat and light and fall into the collecting jar.



Describe **two** precautions that the student should have taken when using the Tullgren funnels in order to ensure a fair test.

1. .....

2. .....

(2 marks)

(b) The student carried out more tests on soil samples from the two woodlands. The results are shown in the table.

	Woodland A	**Woodland B**
Depth of litter layer/cm	6	2
Organic matter content of subsoil/%	20	35
Time for 10 cm^3 water to drain through a 5 cm deep core/secs	247	125
Moisture content/%	26	17
Soil pH	6.0	7.0

(i) Outline a technique which could have been used to determine the moisture content of the soils.

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(4 marks)

(ii) It was found that the litter from woodland **B** contained many more invertebrates than the litter from woodland **A**. Suggest how this may help to explain the results from woodland **B**.

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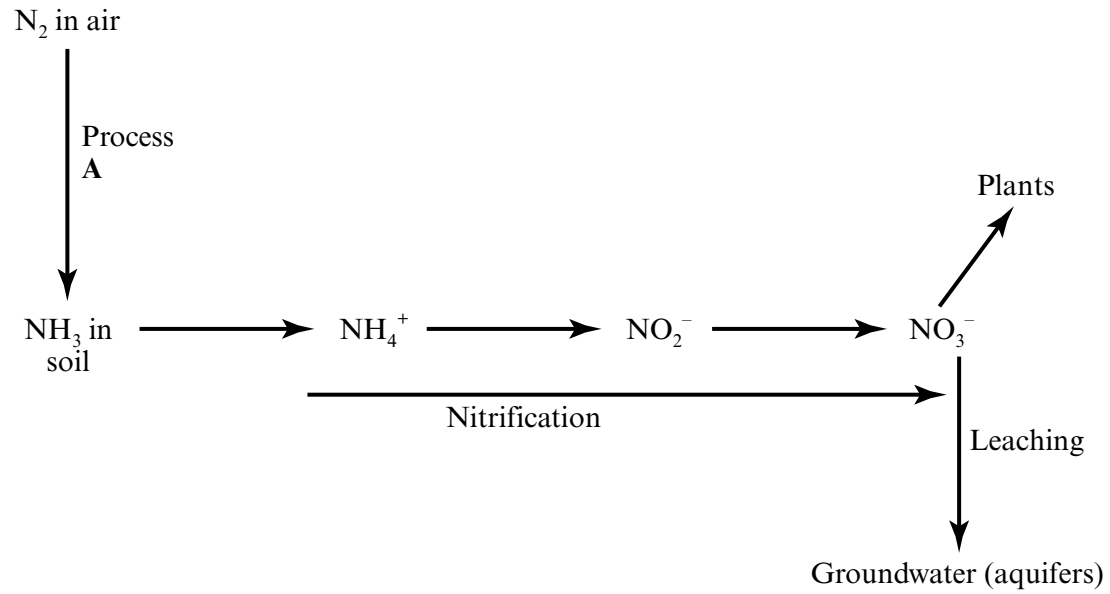
(4 marks)

Turn over ►

10

5 The diagram shows part of the nitrogen cycle.



(a) Name process **A**.

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(1 mark)

(b) Outline the biotic significance of:

(i) process **A**;

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(2 marks)

(ii) nitrification;

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(2 marks)

(iii) leaching.

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(2 marks)

(c) Explain why, despite process **A**, the percentage of nitrogen in the atmosphere stays approximately constant.

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(3 marks)

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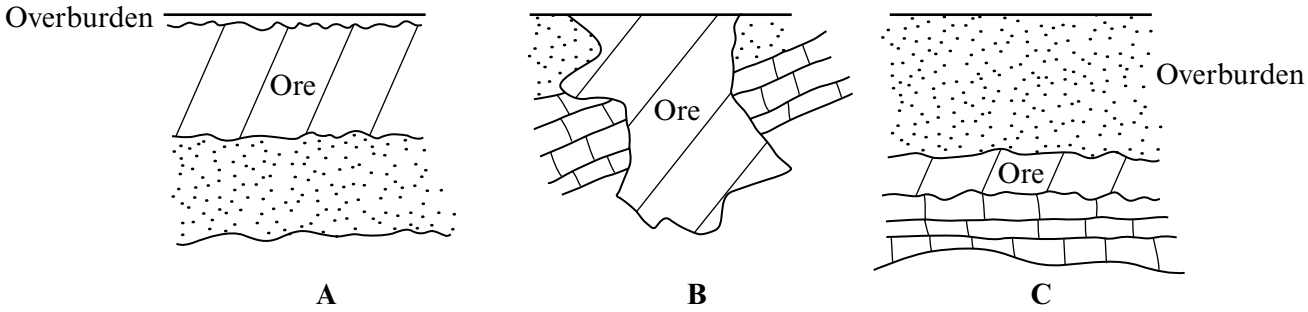
TURN OVER FOR THE NEXT QUESTION

6 (a) The diagrams show three forms of an ore deposit.



The ratio of the thickness of the overburden to the thickness of the deposit is known as the overburden ratio. An overburden ratio of 4:1 is close to the economic limit for low-value ores.

Which **one** of the deposits **A**, **B** or **C**:

(i) has an overburden ratio that may not make it economically worthwhile extracting;

.....

(1 mark)

(ii) is the most likely to be extracted using open-cast techniques?

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(1 mark)

(b) In 1965, it was predicted that proven iron ore reserves would be exhausted by 1990. Suggest why iron ore is still being mined today.

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(3 marks)

(c) Outline the environmental impacts of mining, quarrying and dredging.

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(10 marks)

END OF QUESTIONS

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THERE ARE NO QUESTIONS PRINTED ON THIS PAGE