Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

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General Certificate of Education
June 2003
Advanced Subsidiary Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

ENVIRONMENTAL SCIENCE ESC2
Unit 2 The Lithosphere

Wednesday 4 June 2003 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.

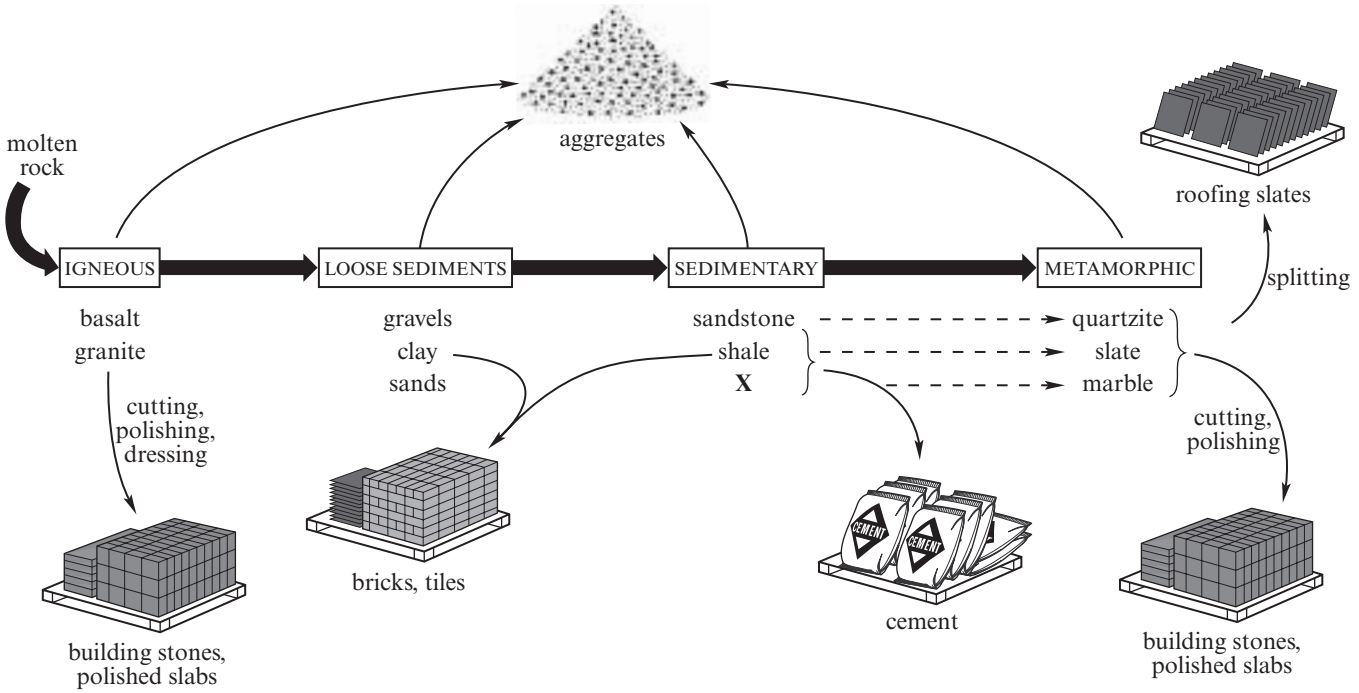
Information

- 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			
7			
8			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

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

1 The diagram shows the formation of some common building materials in terms of the rock cycle.



Source: adapted from D. WILLIAMS, *Building Materials Open University 5268 – Physical Resources and Environment* (O.U.) 1995

(a) Name **one** process involved in the conversion of:

(i) igneous rocks to loose sediments;

.....

(1 mark)

(ii) shale to slate.

.....

(1 mark)

(b) Suggest the identity of **X**.

.....

(1 mark)

(c) Outline the scientific principle involved in:

(i) freeze-thaw weathering;

.....

.....

(1 mark)

(ii) hydrolysis.

.....

.....

(1 mark)

5

2 Phosphorus is an essential plant nutrient.

(a) In what form do plants take up phosphorus?

.....

(1 mark)

(b) Outline how phosphorus is transferred from the ocean to the land.

.....

.....

.....

.....

.....

.....

(3 marks)

(c) Bone Valley near Tampa, Florida, is the world's largest mine for minerals containing phosphorus. Between 10 and 15 million years ago Bone Valley was a shallow sea.

What type of rock is being exploited at Bone Valley?

.....

(1 mark)

5

3 The diagram shows some of the characteristics of two soil cores, **A** and **B**.

(a) What is the source of the organic material in layer **X**?

.....

(1 mark)

(b) In soil **A** suggest an explanation for the change in the percentage of calcium and magnesium in:

(i) layer **X**;

.....

.....

(1 mark)

(ii) layer **Y**.

.....

.....

(1 mark)

(c) One of the soils developed on a parent material of granite, whilst the other soil developed on limestone.

(i) Suggest which of the soils developed on granite.

.....

(1 mark)

(ii) Explain your answer.

.....

.....

(1 mark)

5

TURN OVER FOR THE NEXT QUESTION

LEAVE MARGIN BLANK

4 The graph shows the nitrogen content of soil developing on iron ore spoil heaps in Minnesota.

The graph, from 'The Restoration of Land' by A.D. Bradshaw and M.J. Chadwick (University of California Press, 1980), is not reproduced here due to third-party copyright constraints.

The full copy of this paper can be obtained by ordering ESC2 from AQA Publications Tel: 0161 953 1170

(a) State **two** causes of land dereliction, other than mineral extraction.

1. .....

2. .....

(2 marks)

(b) (i) Describe the trend shown in the graph.

.....

.....

(1 mark)

(ii) Suggest an explanation for the trend.

.....

.....

(1 mark)

4

5 (a) State **three** factors that influence the viability of exploitation of mineral deposits.

1. .....

2. .....

3. .....

(3 marks)

The flow chart shows stages in the production of aluminium from bauxite ore in Jamaica.

Relocation of villagers → land clearance → topsoil removal → opencast mining of bauxite → high temperature and pressure dissolution in sodium hydroxide → flocculation → precipitation of alumina → recycling of solutions → removal of contaminated mud from site → electrolysis of alumina → aluminium

(b) What is meant by the term *opencast mining*?

.....

.....

(1 mark)

(c) Suggest **two** harmful environmental effects of:

(i) ore extraction;

1. .....

2. .....

(2 marks)

(ii) production of alumina from bauxite.

1. .....

2. .....

(2 marks)

(d) Suggest **one** advantage of alloying aluminium with another metal.

.....

(1 mark)

9

TURN OVER FOR THE NEXT QUESTION

6 A student decided to investigate the relationship between soil temperature and moisture content down a slope. The passage below is an extract from the student's method.

"I first had to work out where to put the quadrats. I decided to do this by random sampling. Starting at the top of the slope, I threw the quadrat ten times. This gave me the places where I was to measure the soil moisture and temperature. To ensure that the quadrats weren't biased, I threw five times with my left hand and five with my right. I also varied the velocity of the quadrats to get a varied distance.

At each site, I inserted the temperature probe. This was difficult in some quadrats because of the vegetation in the way. I inserted the probe three times in each quadrat to get an average. I then used the auger to take a soil sample for analysis in the laboratory. In some areas the soil was rocky and samples had to be extracted using a trowel. All samples were put in plastic bags which were labelled to show where I had collected them.

In the laboratory we weighed each sample and recorded its weight. I then burned each sample with a bunsen, scorching off any moisture. I then reweighed each sample. The difference is the water content."

(a) Critically comment on the technique used to identify the sampling points.

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(3 marks)

(b) State **two** precautions that should have been taken in determining soil temperature.

1. .....

2. .....

(2 marks)

(c) Critically comment on the technique used to determine moisture content.

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.....

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.....

(2 marks)

(d) State **three** factors, other than soil moisture, that could affect soil temperature.

1. .....

2. .....

3. .....

(3 marks)

10

7 The table shows changes in land use in the UK since 1947.

	Percentage cover					
	Woodland	**Semi-natural vegetation**	**Water and wetlands**	**Farmland**	**Other**	**Total**
1947	7.0	12.6	1.3	72.7	6.4	100
1969	7.0	10.1	1.1	72.1	9.7	100
1980	7.9	9.2	1.1	71.8	10.0	100
1998	8.2	9.0	1.1	70.5	11.2	100

(a) Explain why woodlands are often used to enhance the environment for amenity use.

.....

.....

.....

.....

(2 marks)

(b) The two largest components of the "Other" category are urban land and derelict land. Suggest **two** further types of land use that could be included in this category.

1. .....

2. .....

(2 marks)

(c) Suggest an explanation for the decline in the percentage cover of semi-natural vegetation.

.....

.....

(1 mark)

(d) Outline the principle involved in using cost-benefit analysis to decide on a proposed change of land use.

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.....

.....

.....

(2 marks)

8 A warden wishes to investigate the level of satisfaction of visitors to a Country Park by conducting a survey. Annual data is required to complete a business plan which aims to increase income from visitors.

(a) Suggest **three** types of information that will be needed from the visitor survey.

1. .....

2. .....

3. .....

(3 marks)

(b) In order to obtain representative data, suggest **two** precautions that should be taken.

1. .....

2. .....

(2 marks)

(c) Discuss **one** example of a conflict in a National Park or green belt. You should describe the nature of the conflict, explain why it arose and how it may be resolved.

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(10 marks)

15

END OF QUESTIONS