

Surname					Other Names				
Centre Number					Candidate Number				
Candidate Signature									

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General Certificate of Education
 June 2004
 Advanced Subsidiary Examination



ENVIRONMENTAL SCIENCE
Unit 2 The Lithosphere

ESC2

Thursday 10 June 2004 Afternoon Session

No additional materials are required.
 You may use a calculator.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
3			
4			
5			
6			
7			
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

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.

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

1 Complete the table by inserting one letter from the list below. The first line has been completed as an example.

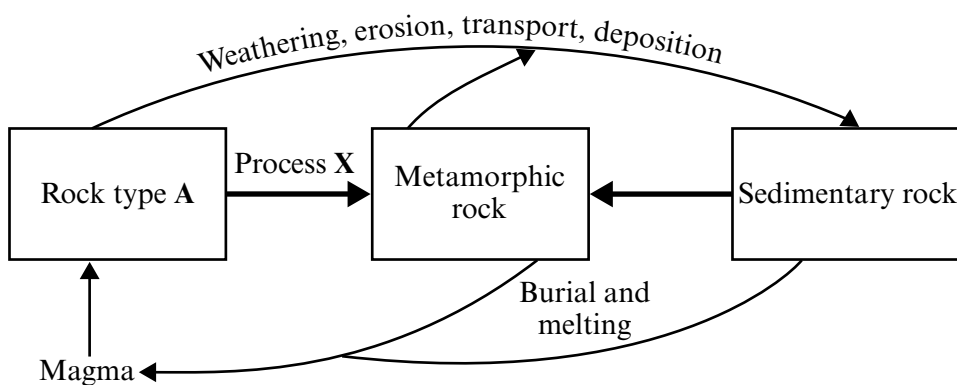
- A phosphate ions (PO_4^{3-})
- B sediments laid down in oceans
- C nitrate ions \longrightarrow nitrite ions ($\text{NO}_3^- \longrightarrow \text{NO}_2^-$)
- D hydrogen carbonate ions (HCO_3^-)
- E forests
- F oxygen (O_2)
- G nitrogen gas \longrightarrow ammonia ($\text{N}_2 \longrightarrow \text{NH}_3$)
- H carbon dioxide (CO_2)
- I ammonium ions \longrightarrow nitrite ions \longrightarrow nitrate ions ($\text{NH}_4^+ \longrightarrow \text{NO}_2^- \longrightarrow \text{NO}_3^-$)
- J ammonium ions (NH_4^+)
- K fauna
- L nitrogen gas (N_2)

	Letter
Gas released during respiration	H
The largest carbon reservoir	
The process of nitrification	
Gas released from denitrification	
Ions least likely to be dissolved	

(4 marks)

4

2 The diagram shows the rock cycle.



(a) Name:

(i) rock type A;

..... (1 mark)

(ii) the conditions needed for process X;

..... (1 mark)

(iii) the product of the metamorphosis of limestone.

..... (1 mark)

(b) Explain what is meant by:

(i) carbonation;

.....

 (2 marks)

(ii) hydration.

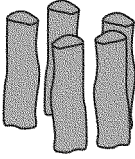
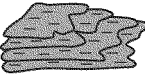
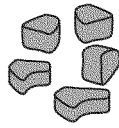

.....

 (2 marks)

(2 marks)

Turn over ►

3 (a) The diagram shows various forms of a particular soil property.

<p>columnar  (prismatic)</p>	<p>allows free vertical movement of soil water</p>	<p>platy </p>	<p>can hinder root development and vertical water movement</p>
<p>blocky </p>	<p>allows soil water movements but can hinder plant growth if tightly packed</p>	<p>granular  (crumb)</p>	<p>allows good seed development and early plant growth</p>

Name the property illustrated.

.....
(1 mark)

(b) Explain what is meant by soil aggregation.

.....
.....
(1 mark)

(c) Outline how soil fertility is affected by soil pH.

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.....
(4 marks)

(d) Explain how deforestation may cause soil erosion.

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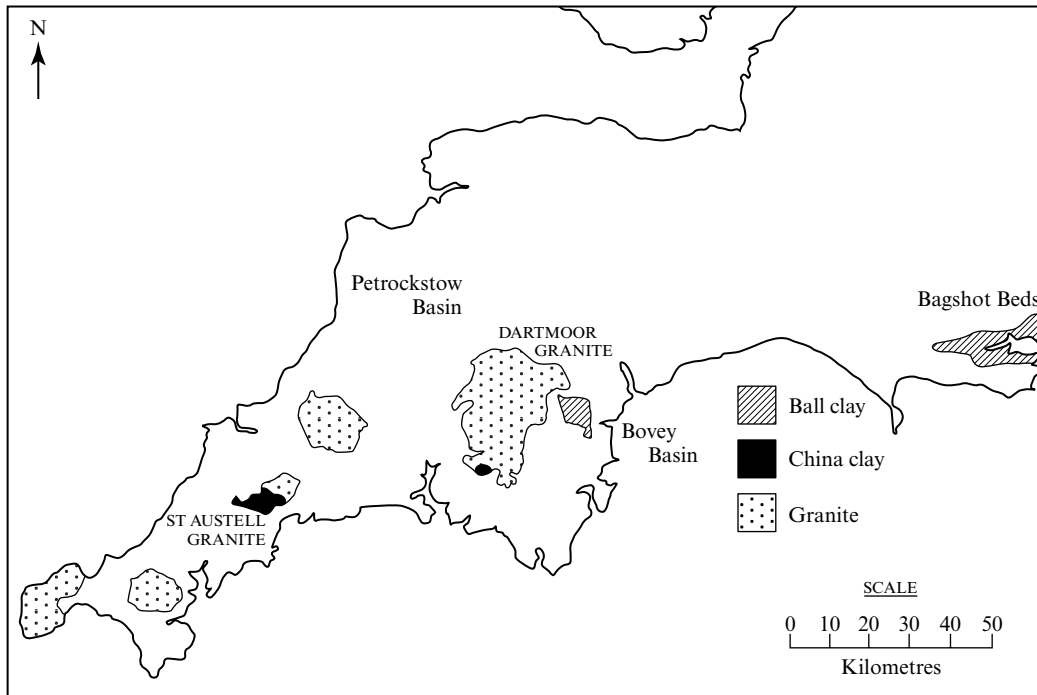
(3 marks)

9

TURN OVER FOR THE NEXT QUESTION

Turn over ►

4 The map shows the location of kaolin (china clay) deposits associated with granite in south-west England.



Source: adapted from D. A. C. MANNING, *Industrial Minerals* (Chapman and Hall) 1995

(a) State **two** end uses of china clay.

1.
.....
2.
.....

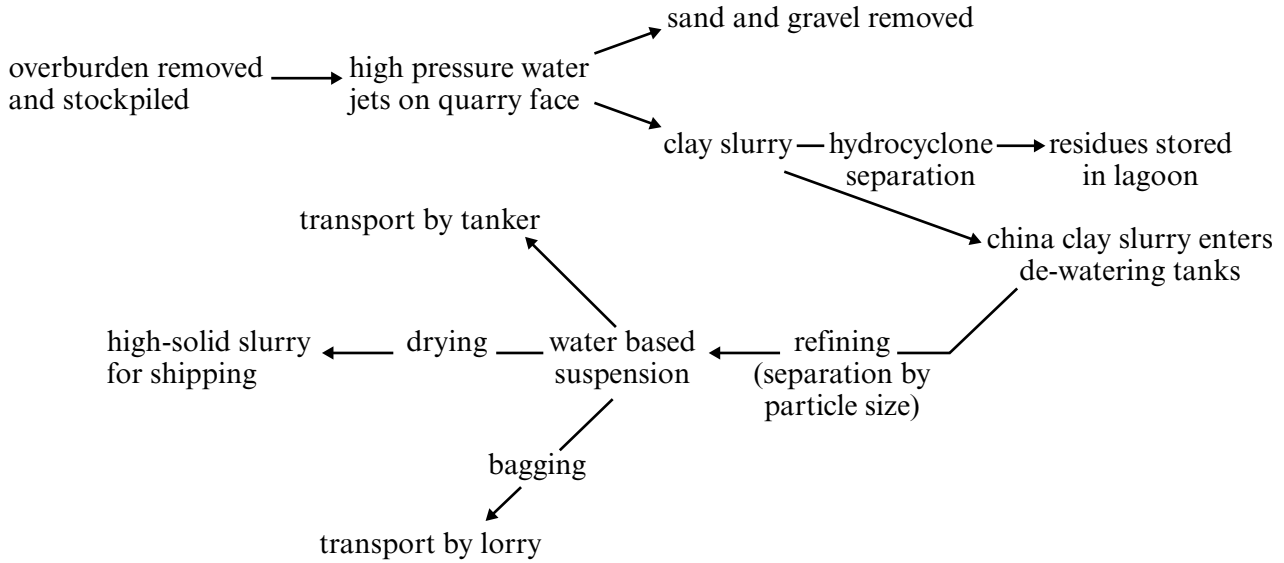
(2 marks)

(b) Suggest **two** factors, other than the size of the deposits, that might affect the viability of exploiting them.

1.
.....
2.
.....

(2 marks)

(c) The diagram shows a production flow chart for china clay.



Suggest:

(i) **two** types of environmental impact that may result from this production method;

- 1.
 - 2.
- (2 marks)*

(ii) **two** possible end uses of the sand and gravel;

- 1.
 - 2.
- (2 marks)*

(iii) why the overburden is stockpiled.

.....

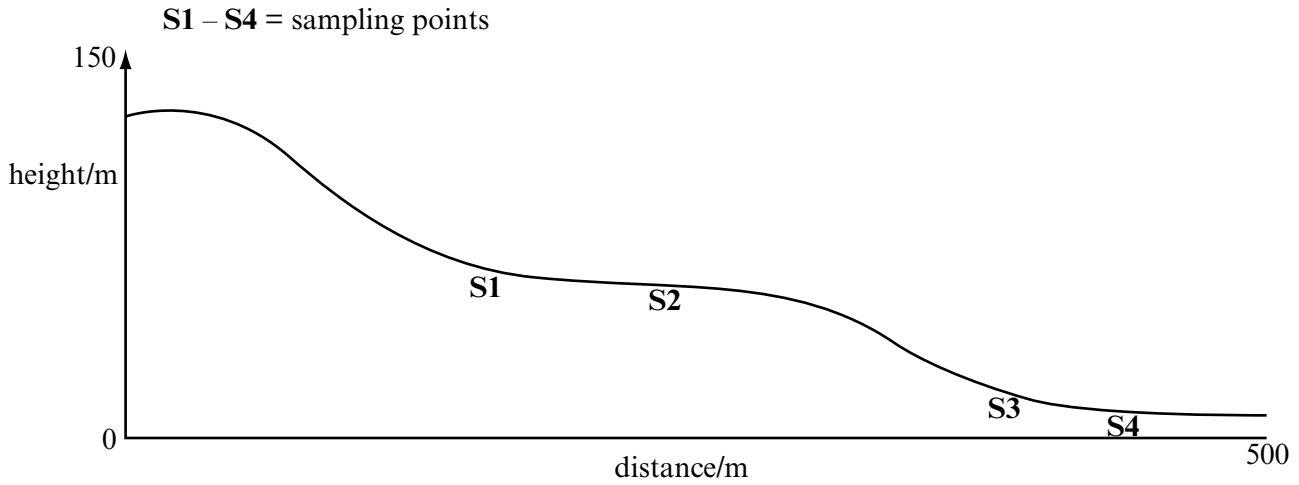
.....

(1 mark)

TURN OVER FOR THE NEXT QUESTION

Turn over ►

5 A student investigated the moisture content of soil down a slope. Samples were taken at four points and transferred in white trays to the laboratory for testing. The diagram shows the sampling points. The table shows the student's results.



Sample No.	Depth/cm.	Moisture content/%	Notes
1	34	12	Hard soil so used auger
2	35	35	Used auger
3	34	62	Boggy – used spade
4	39	85	Used spade

(a) Suggest **four** criticisms of the student's technique.

1.
.....
2.
.....
3.
.....
4.
.....

(4 marks)

(b) Outline a method which could be used to measure the moisture content of the soil.

.....

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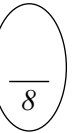
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(4 marks)



TURN OVER FOR THE NEXT QUESTION

Turn over ►

6 The Yorkshire Dales National Park Action Plan included three proposals. These were that:

- | |
|---|
| <ol style="list-style-type: none"> 1. Charges at some car parks should be doubled; 2. An increase in the percentage cover of deciduous woodland in the Park should be encouraged; 3. Some of the most popular footpaths should be re-routed for two years. |
|---|

(a) Suggest a benefit of each proposal.

Proposal 1.

 Proposal 2.

 Proposal 3.

 (6 marks)

(b) In 2002, a landowner in the Yorkshire Dales National Park put forward a proposal to build a wind farm on his land. The Park Authority conducted an Environmental Impact Assessment which included a pricing mechanism that gave a monetary value to each positive and negative effect of the proposed wind farm.

(i) Name the pricing mechanism used.

.....
 (1 mark)

(ii) Suggest how the monetary value of a picturesque view could be estimated.

.....

 (1 mark)

7 Remote Sensing is one technique used to study land use change.

(a) Explain what is meant by Remote Sensing.

.....
.....
.....
.....

(2 marks)

(b) Suggest an explanation for the following observations of the United Kingdom made from satellite imagery.

(i) Most coniferous forest plantations occur in Scotland, northern England and Wales.

.....
.....

(1 mark)

(ii) The percentage of land in the UK devoted to transport has doubled in the last 30 years.

.....
.....

(1 mark)

(c) Discuss the causes of urban dereliction and the methods that can be used to reclaim such land.

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QUESTION 7 CONTINUES ON THE NEXT PAGE

Turn over ►

