

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

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General Certificate of Education  
 January 2003  
 Advanced Subsidiary Examination



**ENVIRONMENTAL SCIENCE**  
**Unit 2 The Lithosphere**

**ESC2**

Friday 10 January 2003 Afternoon Session

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

Time allowed: 1 hour 30 minutes

**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.

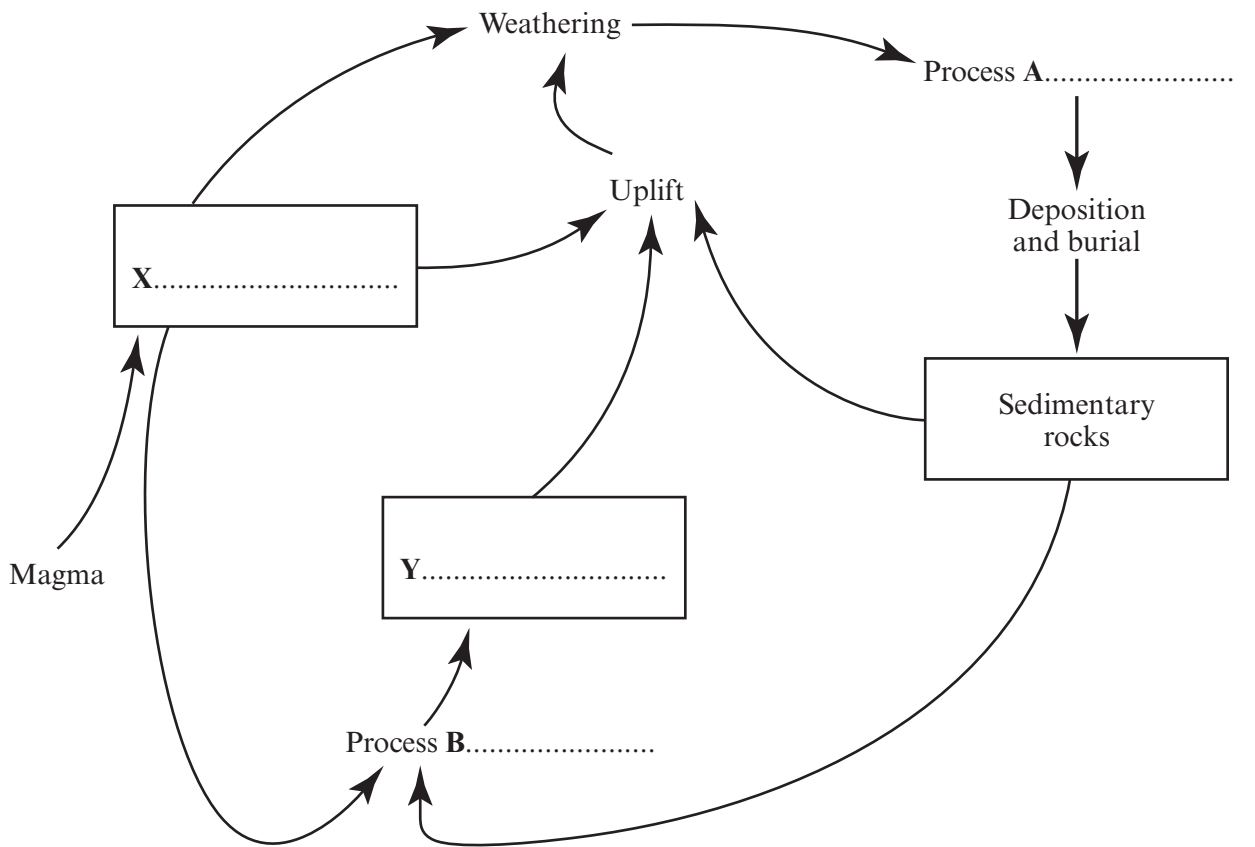
**Information**

- The maximum mark for this paper is 70.
- 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			
Question	Mark	Question	Mark
1			
2			
3			
4			
5			
6			
7			
8			
9			
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

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

1 (a) Complete the diagram of the rock cycle.



(4 marks)

(b) What is the source of energy in the production of magma?

.....

(1 mark)

2 (a) Suggest why:

(i) granite is suitable for use as kerbs and roadstone;

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

(ii) china clay is suitable for use as a paper filler.

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

(b) Explain the term *cut-off grade*.

.....  
.....  
.....  
.....  
(2 marks)

4

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

3 The diagram shows some of the reservoirs and transfers of carbon.

□  
□  
The diagram 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) Calculate the total percentage of the carbon store that is held in marine sediments and sedimentary rocks. Show your working.

Answer .....  
(1 mark)

(b) Explain why the carbon cycle is described as being “driven by solar energy”.

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

(3 marks)

(c) Suggest why the rate of transfer of phosphorus is slow in comparison to the rate of transfer of carbon and nitrogen.

.....  
.....

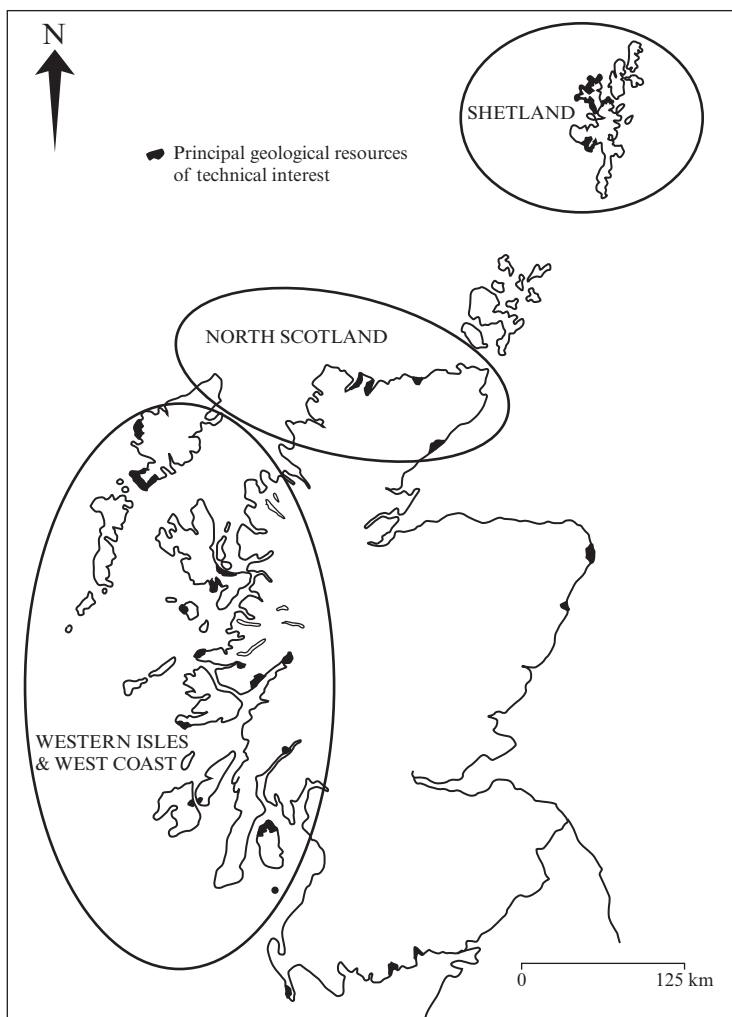
(1 mark)

5

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

4 The map shows coastal superquarries in Scotland which supply aggregates for use in South East England.



Source: Coastal Superquarries to supply South East England Aggregate Requirements (HMSO) 1992

(a) Suggest **two** economic factors that are important when choosing the location of a coastal superquarry.

- 1. ....
- .....
- 2. ....
- .....

(2 marks)

(b) Suggest **two** possible objections made by the planning authorities to the development of the quarries in the areas shown.

- 1. ....  
.....
- 2. ....  
.....

(2 marks)

(c) Explain why it is economic to supply aggregates from Scotland to South East England.

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

(2 marks)

6

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

5 A government housing committee has stated that the majority of the one to two million new homes that will be needed over the next fifteen years should be built as extensions to existing urban areas. The committee believes that *brownfield sites* (derelict inner city areas) are not the only answer.

(a) Suggest why so many new homes are thought to be needed over the next fifteen years.

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

(b) Explain why this statement was regarded as a threat to the green belt.

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

(c) Suggest **one** potential problem for house builders using brownfield sites.

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

3



6 Complete the table.

Land management term	Definition
	Offers payments to landowners to sensitively manage and to improve access to important landscape features.
National Park	
	Specific area designed to attract large numbers of visitors so that other areas are protected.

(3 marks)

7 A landowner has been refused planning permission to build and run a café on the banks of a lake which is situated inside a National Park. The landowner has obtained a petition, signed by over 100 visitors to the lake, supporting the idea of developing the café. Arguing that the development of the café is consistent with the purpose of the National Park, the landowner intends to appeal against the decision.

(a) Suggest **two** reasons why planning permission has been refused.

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

(2 marks)

(b) Suggest why the development of the café might be considered consistent with the purpose of the National Park.

- .....  
.....  
.....

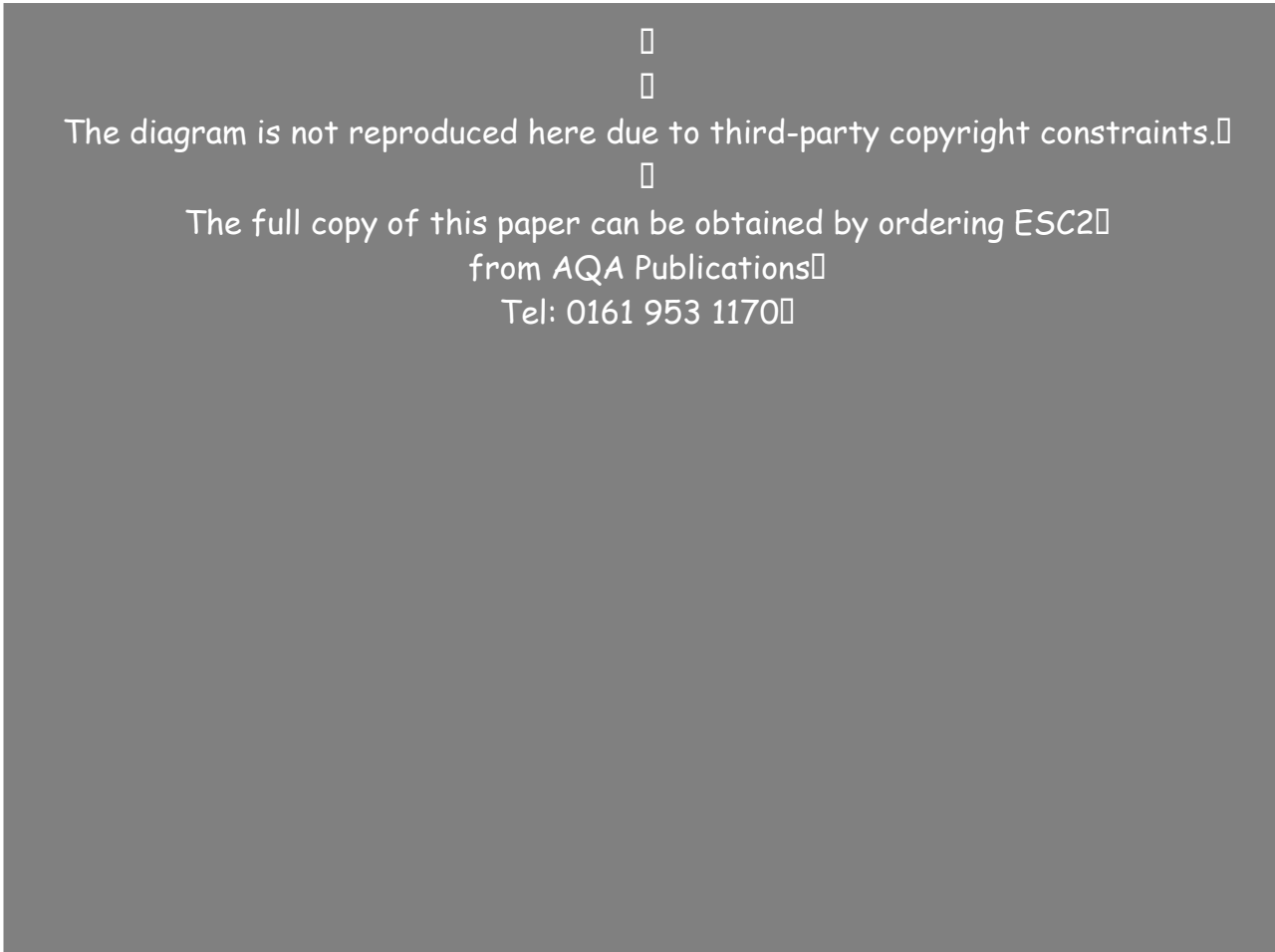
(2 marks)

3

4

Turn over ►

8 The triangular graph shows the percentage composition of soils.



The percentage composition of two soils **A** and **B** was determined as:

**A** 40% sand, 30% silt, 30% clay;

**B** 10% sand, 10% silt, 80% clay.

(a) (i) Using the soil triangle, identify soils **A** and **B**.

**A** .....

**B** .....

(2 marks)

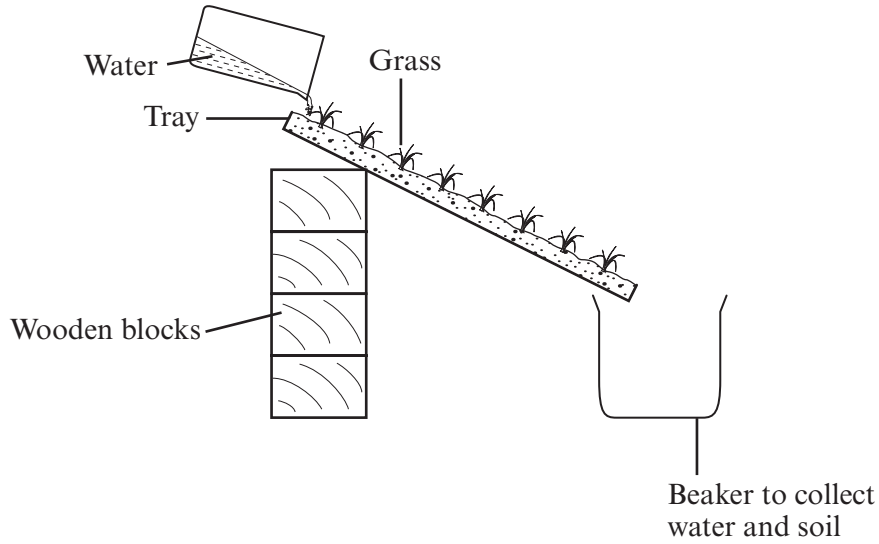
(ii) Which soil contains the greater proportion of the largest soil particles?

.....

(1 mark)



- (f) A student investigated the effect of slope gradient on soil erosion. Grass seed was allowed to germinate in trays of soil which were then each tilted at a different angle. Water was poured on to the highest point of each tray. The student's apparatus is shown in the diagram.



Suggest **three** precautions the student should have taken in performing the investigation in order to ensure a fair test.

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

(3 marks)

(g) Explain how deforestation may accelerate soil erosion.

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(4 marks)

20

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

- 9 A student decided to investigate the effect of aspect on the weathering of gravestones. Thirty gravestones were chosen randomly. The student estimated the degree of weathering of a part of the lettering on each stone. The student’s results are shown in the table.

Aspect	Number of stones examined	Average degree of weathering
N	7	2
NE	2	2
E	1	2
SE	2	1
S	2	1
SW	8	3
W	3	4
NW	5	3

**Key to weathering scale:**

- 1 Little or no weathering, letters perfectly legible
- 2 Some weathering but lettering still legible
- 3 Significant weathering
- 4 Severe weathering, letters illegible

The student concluded “Aspect is an important factor in weathering. The degree of weathering is significantly greater on west-facing stones”.

- (a) Describe a method to sample the gravestones randomly.

.....

.....

.....

.....

.....

.....

(3 marks)

- (b) The student discovered that 2% of the stones in the graveyard had been sampled. Calculate the total number of stones in the graveyard. Show your working.

Answer .....  
(2 marks)



