

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

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General Certificate of Education
 June 2006
 Advanced Subsidiary Examination



ENVIRONMENTAL SCIENCE
Unit 2 The Lithosphere

ESC2

Thursday 8 June 2006 1.30 pm to 2.30 pm

<p>You will need no other materials. You may use a calculator.</p>
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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			

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

- 1 Complete the table by selecting the appropriate letter from the list below. The first one has been completed as an example.

- A Neutral
- B Fixation
- C Turbidity
- D Acidic
- E Respiration
- F Slate
- G Marble
- H Ions
- I Nitrification
- J Denitrification
- K Salinity

Description	Letter
Process which increases carbon dioxide levels in soil	E
Product of metamorphism of shale / clay	
Conversion of nitrite ions into nitrate ions	
Term describing level of suspended sediment in water	
The pH at which most plant nutrients are available	
Conversion of nitrogen gas into ammonia	

(5 marks)

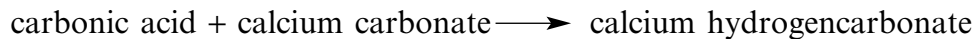
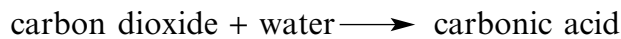
2 (a) Define the term weathering.

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.....
(2 marks)

(b) Why does soil usually differ chemically from its parent material?

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.....
(2 marks)

(c) The Dolomites are a limestone mountain range in the Italian Alps. The equations show the acid dissolution of limestone (calcium carbonate).



(i) What name is given to this type of chemical weathering?

.....
(1 mark)

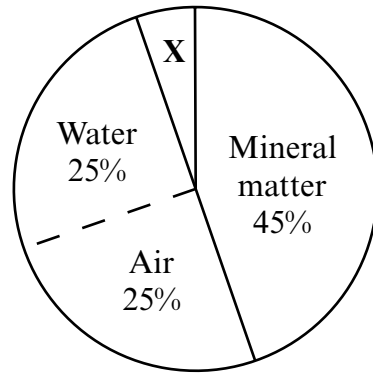
(ii) Suggest **two** possible sources of the carbon dioxide.

1.
2.
(2 marks)

(iii) Suggest how, within a matter of months, carbon atoms in the Dolomites may become part of a sea shell.

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(3 marks)

3 The graph shows the proportions of the main soil components.



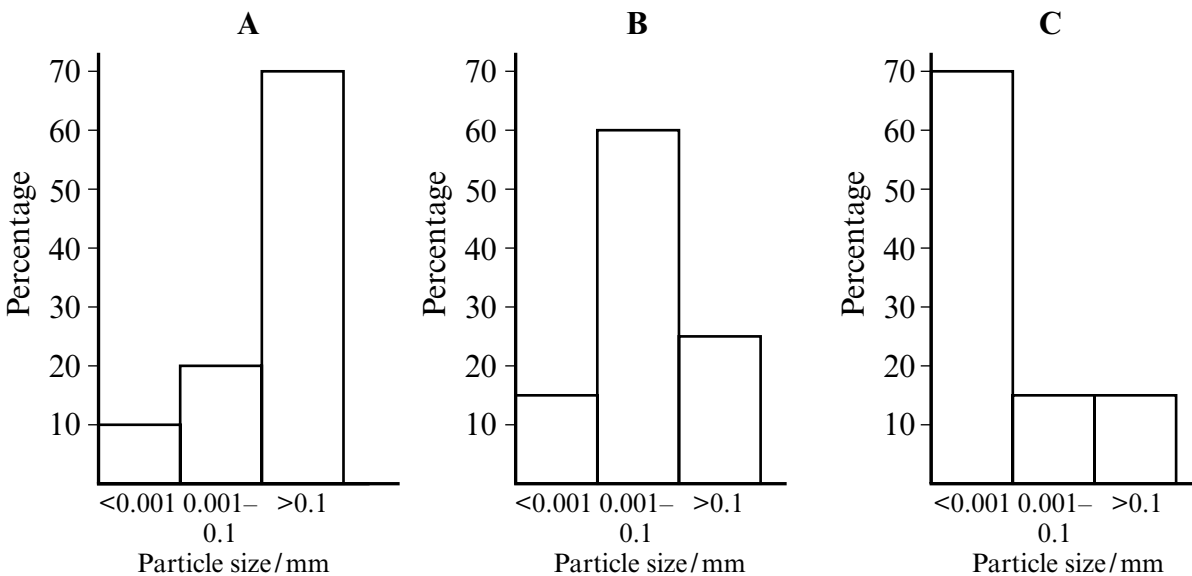
(a) Identify the missing component (X).

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(1 mark)

(b) State **two** advantages of having a high proportion of air in a soil.

1.
 2.
- (2 marks)

(c) Graphs A, B and C show the frequency distribution of different sized particles in three different soils.



(i) Which is the clay soil?

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(1 mark)

(ii) Explain your answer.

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.....

(1 mark)

(d) Outline the effects of soil texture on the following soil properties:

(i) drainage;

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(2 marks)

(ii) nutrient levels;

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(2 marks)

(iii) temperature.

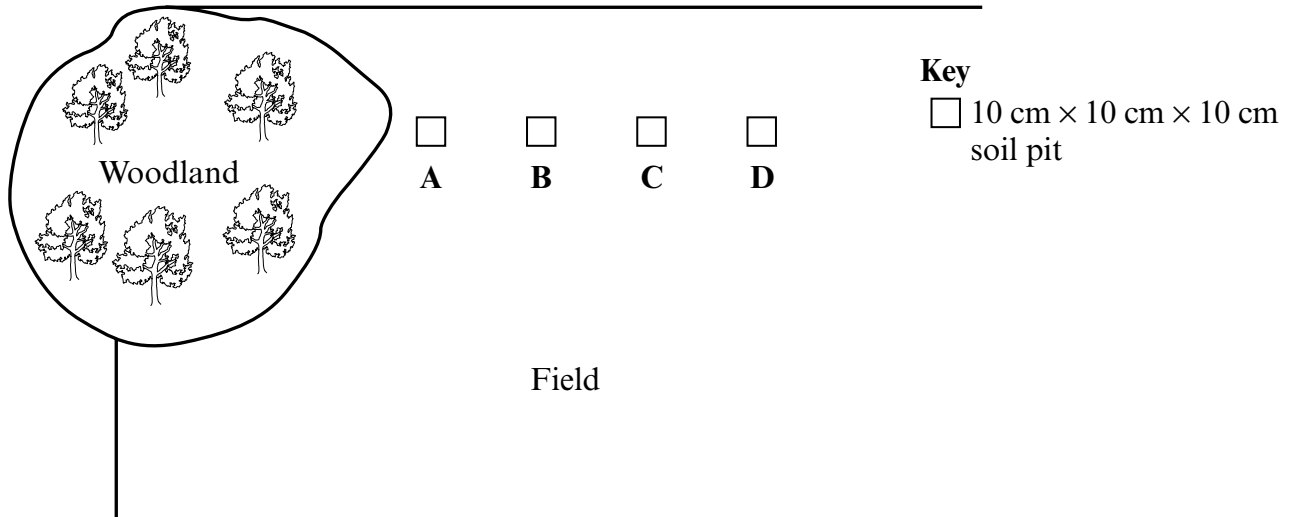
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(1 mark)

Turn over for the next question

4 Environmental Science students investigated the effect of a deciduous woodland on the soil properties of an adjacent field. Each year, the field was used for sheep grazing before being cut for silage (animal feed).

The diagram shows the position of four soil pits dug in the field.



The results of the investigation are shown in the table.

Sample	A	B	C	D
Number of earthworms / m ³	7000	6000	6000	5000
pH	7.5	7.0	7.0	7.0
Moisture content / %	22	24	18	16
Organic matter content / %	38	32	21	22

(a) (i) Suggest **two** improvements which could have been made to the sampling technique.

1.
-
2.
-

(2 marks)

- (ii) Calculate the number of earthworms which were actually found in the soil from the pit at sampling point A.

Show your working.

Answer
(1 mark)

- (b) The students' conclusions were as follows.

“It came as no surprise that there were more earthworms closest to the wood. This is because there is more leaf litter there. The earthworms mix this in, increasing the organic matter content and, because the leaves are wet, this increases the moisture content.”

Critically comment on these conclusions.

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(4 marks)

- (c) What is the role of earthworms in soil formation?

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(3 marks)

5 Following a public inquiry and a cost-benefit analysis, a property developer’s proposal to build high-density, low-cost housing in an area of green belt was rejected.

(a) Outline the principles of:

(i) *a public inquiry;*

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(2 marks)

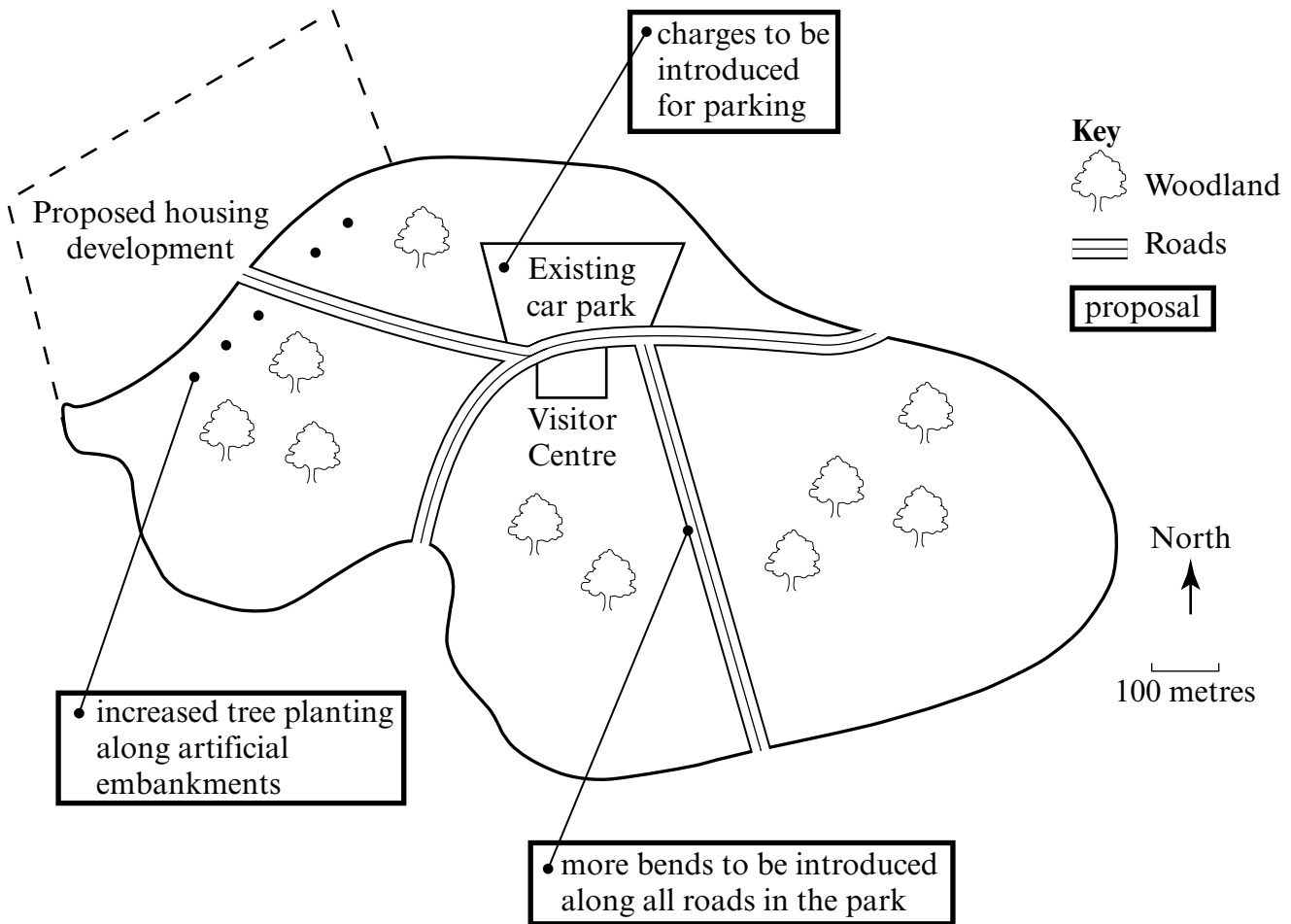
(ii) *cost-benefit analysis;*

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(2 marks)

(iii) *green belts.*

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.....
(2 marks)

(b) The developer decided to apply to build an alternative housing development on the edge of a Country Park. An Environmental Impact Assessment (EIA) resulted in the proposals shown in the diagram.



Outline the purposes of **two** of the proposals shown.

1.

2.

(4 marks)

6 (a) Using **two** named examples, explain how the properties of non-metallic minerals are related to their uses.

1. Example

Properties

.....

.....

2. Example

Properties

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(6 marks)

(b) Discuss the factors which affect the viability of exploiting mineral deposits.

Quality of Written Communication will be assessed in this answer.

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