| Surname | | Other Names | |
|---|---|---|---|
| Centre Number | | | Candidate Number | |
| Candidate Signature | | | |

For Examiner's Use

General Certificate of Education
January 2008
Advanced Subsidiary Examination

**ENVIRONMENTAL SCIENCE** **ESC2**
**Unit 2 The Lithosphere**

Wednesday 16 January 2008 9.00 am to 10.00 am

**You will need no other materials.**
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.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

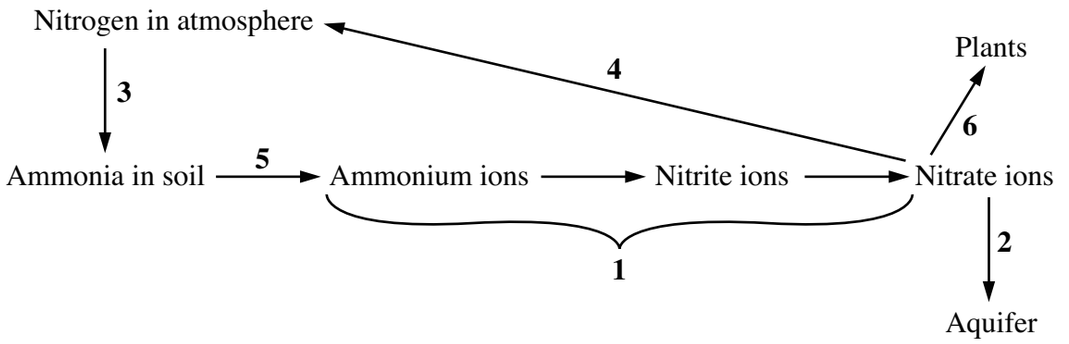
**Information**

- 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 | | | |
|---|---|---|---|
| Question | Mark | Question | 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** The diagram shows the nitrogen cycle.




Complete the table by writing in the appropriate process or number.

| Process | Number |
|---|---|
| Absorption | |
| Nitrogen fixation | |
| | **1** |
| Denitrification | |
| | **2** |

*(5 marks)*

**5**

LEAVE MARGIN BLANK

**2** (a) (i) State **one** major chemical form in which carbon exists in seawater.

.....

*(1 mark)*

(ii) There is a constant movement of carbon between the oceans and the atmosphere.

Suggest **three** factors that influence the speed of this movement.

1 .....

2 .....

3 .....

*(3 marks)*

(b) Explain how land use change can increase the amount of carbon dioxide in the atmosphere.

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*(2 marks)*

(c) Suggest how a carbon atom, breathed out in a carbon dioxide molecule by a dinosaur, ended up in a lump of coal.

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*(4 marks)*

**10**

**3** A student compared the moisture content and organic matter content of soils taken from two farms, **A** and **B**.

This is what the student did.

Stage 1 Collected soil samples from each farm
Stage 2 Removed surface litter and roots
Stage 3 Weighed them to find initial mass (M1)
Stage 4 Heated them to a constant mass (M2)
Stage 5 Heated them to a much higher temperature to constant mass (M3)

(a) Suggest:

(i) **one** precaution to ensure a fair test that the student should have taken while collecting the samples

.....

.....

*(1 mark)*

(ii) the purpose of Stage 4

.....

.....

*(1 mark)*

(iii) a suitable temperature for Stage 4.

.....

.....

*(1 mark)*

(b) The results are summarised in the table below.

| | Source of soil | |
|---|---|---|
| | **Farm A** | **Farm B** |
| M1 / g | 420 | 360 |
| M2 / g | 294 | 270 |
| M3 / g | 126 | 150 |
| Moisture content / % | | 25 |
| Organic matter content / % | | 33 |

Fill in the missing values in the table. Show your working.

*(4 marks)*

(c) Explain how soil texture influences the soil water-holding capacity.

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*(3 marks)*

**10**



**Turn over ➤**

**4** Annually, the Boulby mine in North East England produces 1 million tonnes of potash ($K_2O$). This supplies 55 % of UK potash fertiliser.

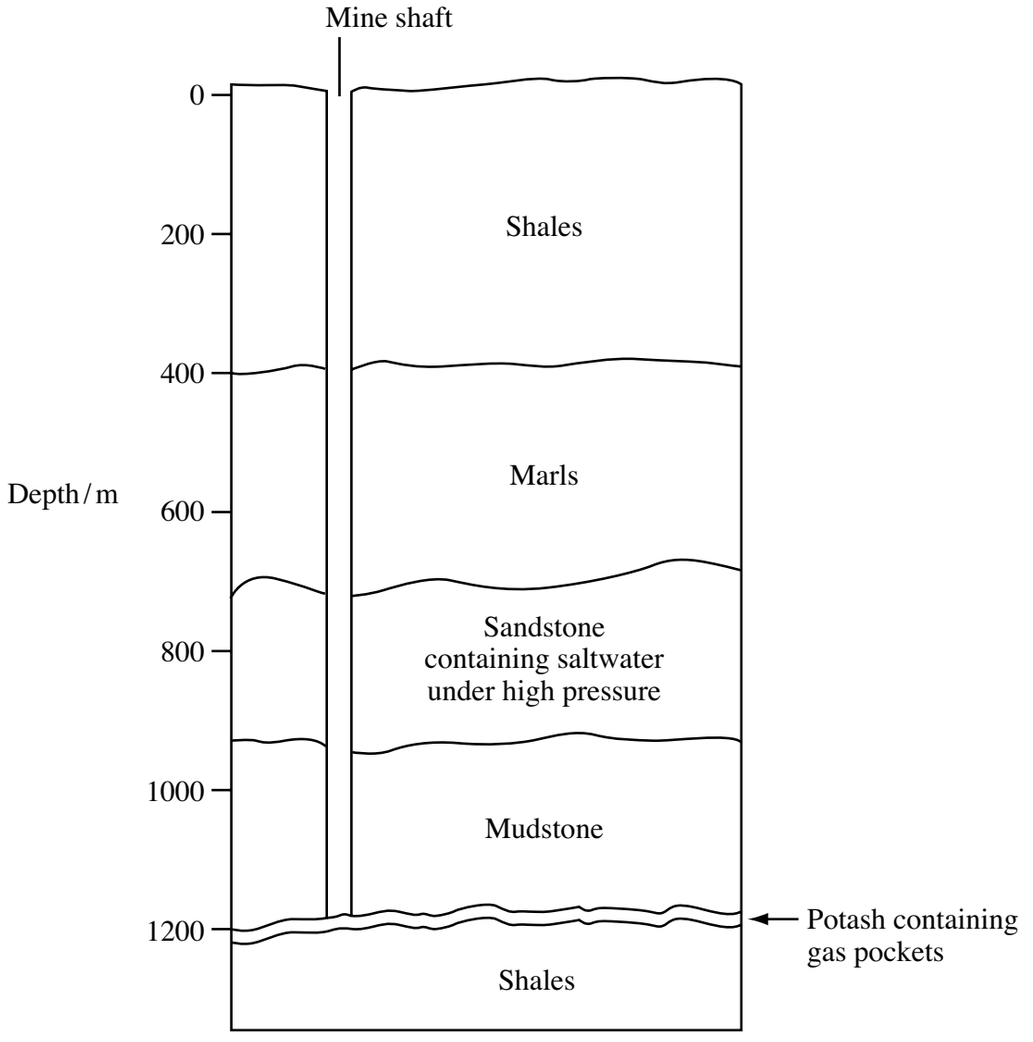
(a) What is the approximate total annual consumption of potash fertiliser in the UK in millions of tonnes?

Draw a ring around the correct answer.

**1·10** **2·09** **1·81** **0·55**

*(1 mark)*

(b) The diagram shows a cross-section through the deposit and overlying material.



Using information from the diagram, suggest **two** problems that had to be overcome before the potash could be successfully mined.

1 .....

.....

2 .....

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*(2 marks)*

(c) Sinking the mine shaft was very expensive. What other factors would have been considered before the decision was made to sink the mine?

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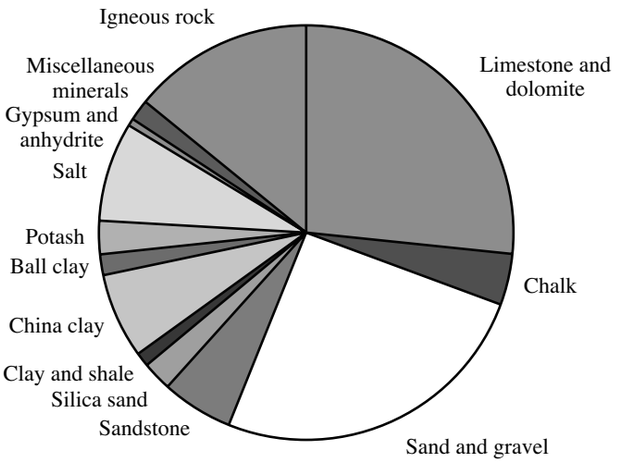
*(4 marks)*

**Question 4 continues on the next page**

(d) The pie chart shows the value of United Kingdom construction and industrial mineral production in 2004.




Source: IPR/85-15C British Geological Survey © NERC

(i) Which rock type contributes most value to UK mineral production?

Tick (✓) the correct box.

☐ Igneous

☐ Sedimentary

☐ Metamorphic

*(1 mark)*

(ii) State **two** major uses of limestone in construction.

1 .....

2 .....

*(2 marks)*

**10**

LEAVE MARGIN BLANK

**5** Lake Windermere is an extremely popular tourist attraction in the Lake District National Park. Over the years, conflict has increased between recreational activities. In particular, many rowers, yacht owners and windsurfers were unhappy with the effects of increasing numbers of water-skiers and large power boats. In 1991, the Lake District National Park Board attempted to impose a 10 mph speed restriction on Lake Windermere. The aim was to decrease the number and the speed of motorboats and water-skiers. A Public Inquiry took place.

(a) State **two** main purposes of the National Park designation.

1 .....

.....

2 .....

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*(2 marks)*

(b) The Public Inquiry considered the environmental benefits and the economic impacts of introducing the speed limit.

Suggest factors that would have been discussed under:

(i) environmental benefits

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*(3 marks)*

(ii) economic impacts.

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*(2 marks)*

(c) The National Park Board used cost benefit analysis in their presentation to the Inspector.

Outline the principles of *cost benefit analysis*.

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*(2 marks)*

(d) Although the Inspector ruled to allow the speed limit, his decision was initially overruled.

Who is able to overrule the Inspector's decision?

.....

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*(1 mark)*

10

LEAVE MARGIN BLANK

**6** (a) Why is soil considered a finite resource?

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*(1 mark)*

(b) Explain the terms:

(i) weathering

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*(2 marks)*

(ii) leaching.

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*(2 marks)*

(c) Discuss the factors which influence soil fertility.

*Quality of Written Communication will be assessed in this answer.*

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*LEAVE MARGIN BLANK*

LEAVE MARGIN BLANK

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*(10 marks)*

15

**END OF QUESTIONS**

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