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

| For Examiner's Use | |
|---|---|
| Examiner's Initials | |
| Question | Mark |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| TOTAL | |

General Certificate of Education
Advanced Subsidiary Examination
January 2011

# Environmental Studies ENVS2

## Unit 2 The Physical Environment

**Tuesday 18 January 2011 9.00 am to 10.30 am**

**You will need no other materials.**
You may use a calculator.

**Time allowed**
- 1 hour 30 minutes

**Instructions**
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 90.
  Two of these marks are for the Quality of Written Communication.
- You will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.
- Question 9(c) should be answered in continuous prose.
  Quality of Written Communication will be assessed in this answer.

**There are no questions printed on this page**

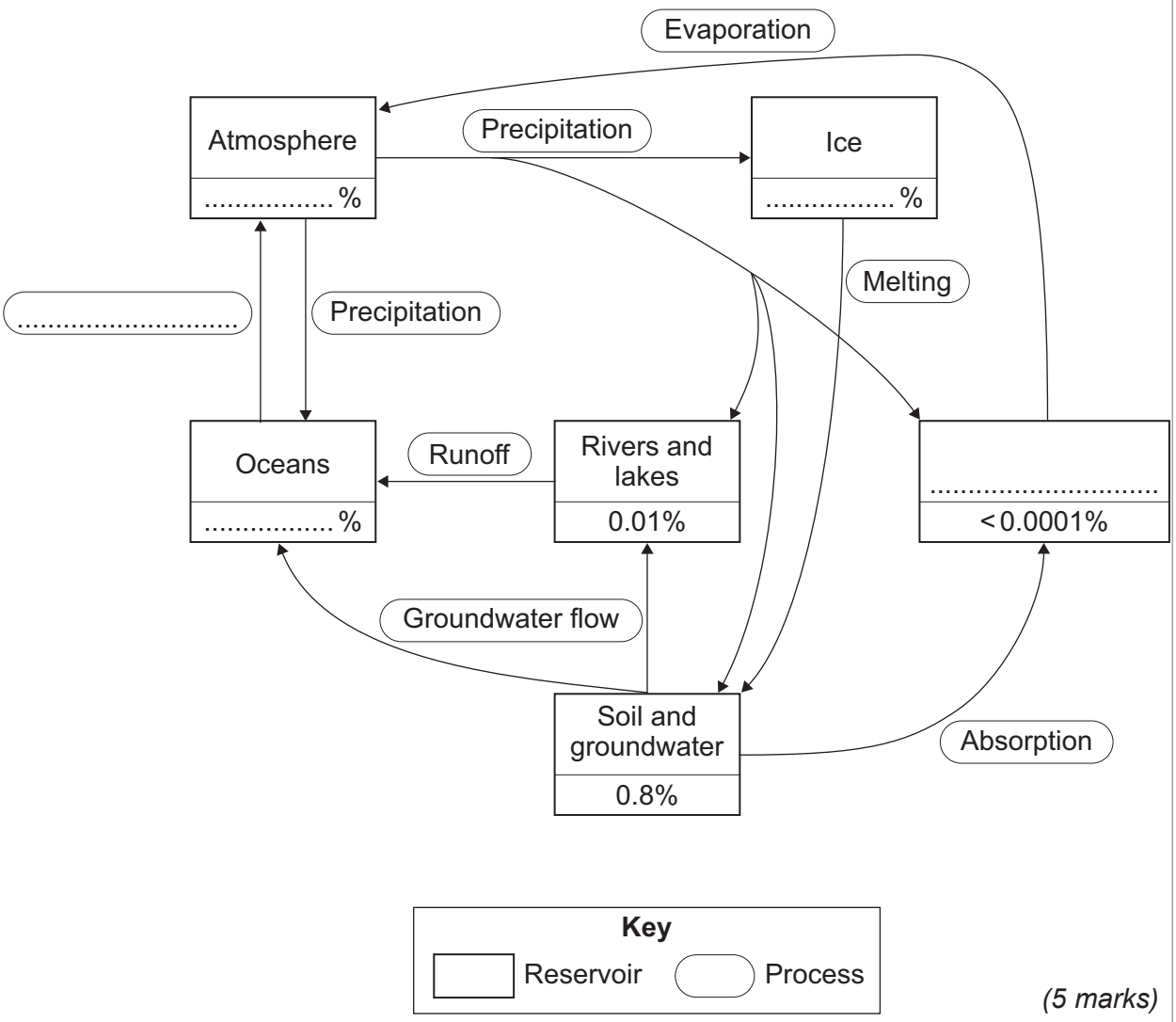
**DO NOT WRITE ON THIS PAGE**
**ANSWER IN THE SPACES PROVIDED**

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

**1** The diagram shows the hydrological cycle.

Complete the diagram by adding, from the list, the names of the missing reservoir and process, and the percentages of total water.

97%
2%
0.001%
50%
Evaporation
Interception
Lithosphere
Biota




*(5 marks)*

5

**2** A student collected soil samples from a mine spoil heap as part of a study to assess its fertility for a revegetation and stabilisation project.
Some of the results for two samples are shown in the table.

| Item | Heating temperature / °C | Period since start of heating at that temperature / hours | Mass / g | |
|---|---|---|---|---|
| | | | Sample A | Sample B |
| Weighing dish | - | - | 8.45 | 8.96 |
| **Original sample + weighing dish** | - | 0 | 27.35 | 35.23 |
| Sample + weighing dish | 110 | 12 | 20.56 | 29.66 |
| Sample + weighing dish | 110 | 24 | 18.45 | 27.29 |
| Sample + weighing dish | 110 | 36 | 18.45 | 26.78 |
| Sample + weighing dish | 110 | 48 | 18.45 | 26.78 |
| **Dried sample + weighing dish** | 500 | 0 | 18.45 | 26.78 |
| Sample + weighing dish | 500 | 1 | 16.40 | 21.99 |
| Sample + weighing dish | 500 | 2 | 15.43 | 21.99 |
| Sample + weighing dish | 500 | 3 | 15.43 | 21.99 |

**2 (a)** Using the information in the table, estimate:

**2 (a) (i)** the percentage water content of **Sample A**
Show your working.

.....%
*(2 marks)*

**2 (a) (ii)** the percentage organic matter content of **Sample B**.
Show your working.

.....%
*(2 marks)*

**2 (b)** Suggest how the accuracy of the study may be ensured by the appropriate storage of the samples:

**2 (b) (i)** between sample collection and first weighing

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*(1 mark)*

**2 (b) (ii)** between the end of heating and final weighing.

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*(1 mark)*

**2 (c)** Outline methods, other than revegetation, that can be used to stabilise mine spoil heaps.

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*(4 marks)*

**10**

**Turn over for the next question**

**3** The picture shows a Tüllgren funnel.

**3 (a) (i)** Describe how a Tüllgren funnel may be used to extract small invertebrates from a soil sample.

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*(4 marks)*

**3 (a) (ii)** Explain why some soil invertebrates cannot be extracted using a Tüllgren funnel.

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*(2 marks)*

**3 (b)** Habitat biodiversity is affected by soil pH.

Describe how soil pH may be measured.

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*(3 marks)*

**3 (c)** Which of the following ranges is suitable for the growth of most plants?

| | | |
|---|---|---|
| pH 1.0 | to | pH 6.0 |
| pH 4.4 | to | pH 7.0 |
| pH 7.0 | to | pH 10.0 |
| pH 10.0 | to | pH 14.0 |

pH ..... to pH ..... *(1 mark)*

10

**Turn over for the next question**

**4** The photograph shows a water steriliser that uses ultraviolet light to kill pathogens in borehole water for private domestic use.


**4 (a)** Name **two** other ways of sterilising water for domestic use.

1 .....

2 .....

*(2 marks)*

**4 (b)** Describe **two** treatment processes that are more likely to be used for water from rivers than for water from aquifers.

1 .....

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2 .....

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*(4 marks)*

**4 (c) (i)** Outline how a reservoir may be used to prevent extremes of water flow in the river downstream.

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*(1 mark)*

**4 (c) (ii)** Outline **other** ways in which a reservoir is likely to change the river downstream.

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*(3 marks)*

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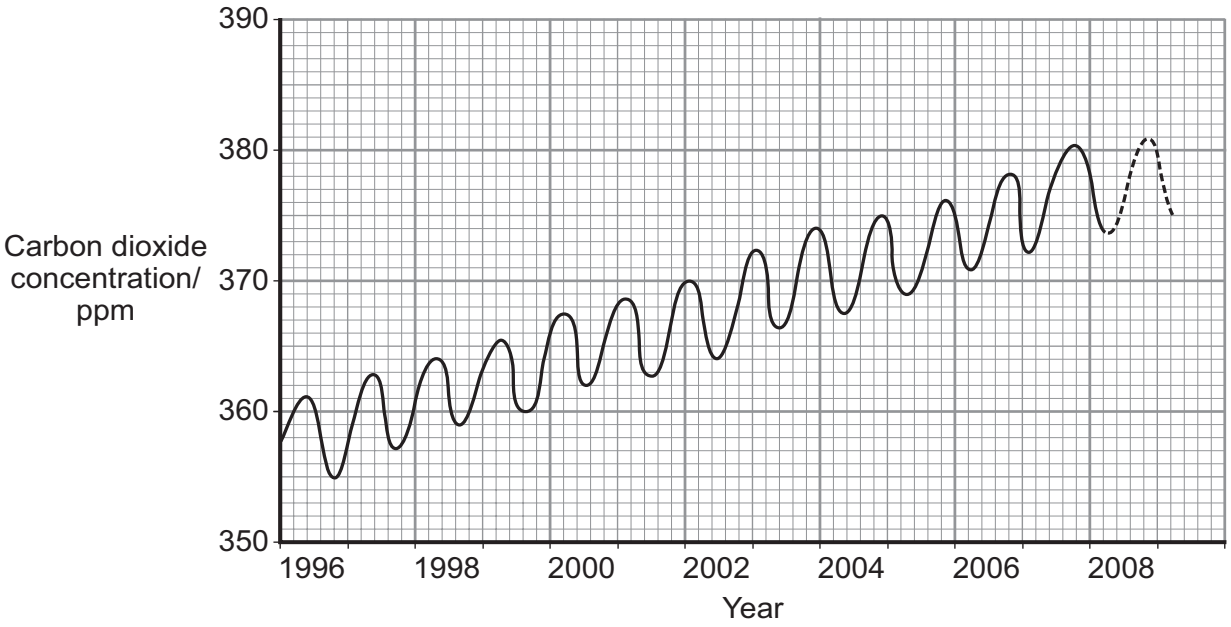
**Turn over for the next question**

**5** The graph shows trends in atmospheric carbon dioxide concentrations over a 12 year period.




**5 (a)** Explain why the carbon dioxide concentration fluctuates during each year.

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*(2 marks)*

**5 (b) (i)** Explain why the long-term trend shown by the graph is likely to change global atmospheric temperatures.

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*(2 marks)*

**5 (b) (ii)** Name **two** other gases that may also change global atmospheric temperatures.

Gas 1 .....

Gas 2 .....

*(2 marks)*

**5 (c)** Use the processes that are involved in global atmospheric temperature changes to explain the difference between positive and negative feedback mechanisms.

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*(4 marks)*

**10**

**Turn over for the next question**

**6** **Graph A** shows the mean ozone concentrations over a research station in Antarctica during a 35 year period. **Graph B** shows the same data with lines added to show the standard deviations of each mean value.

Graphs not reproduced here due to third-party copyright constraints

**6 (a)** Describe the trends shown by **Graph A**.

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*(2 marks)*

**6 (b)** How does the use of the standard deviation lines shown in **Graph B** increase understanding of the mean values used to draw the graphs?

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*(1 mark)*

**6 (c)** Name the group of gases released by human activities that caused the ozone depletion shown by the graphs, **and** outline the chemical reactions involved.

Gases .....

Chemical reactions .....

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*(3 marks)*

**6 (d)** Outline the methods that have been used to control ozone depletion.

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*(4 marks)*

**10**

**Turn over for the next question**

**7** The photograph shows a building that has suffered structural damage.

**7 (a)** Suggest how groundwater abstraction may have caused this damage.

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*(1 mark)*

**7 (b)** Outline how aquifer water levels may be maintained without reducing abstraction rates.

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*(1 mark)*

**7 (c)** Describe **one** method that may be used to produce potable water from seawater.

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*(3 marks)*

**7 (d)** Describe the methods that may be used to reduce the amount of water that is treated by water companies to meet public demand.

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*(5 marks)*

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**Turn over for the next question**

**8 (a)** Outline how soil structure affects soil fertlility.

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*(2 marks)*

**8 (b)** The photographs show two sets of equipment that can be used to analyse soil texture.

Describe **one** method that can be used to analyse the texture of a soil sample.

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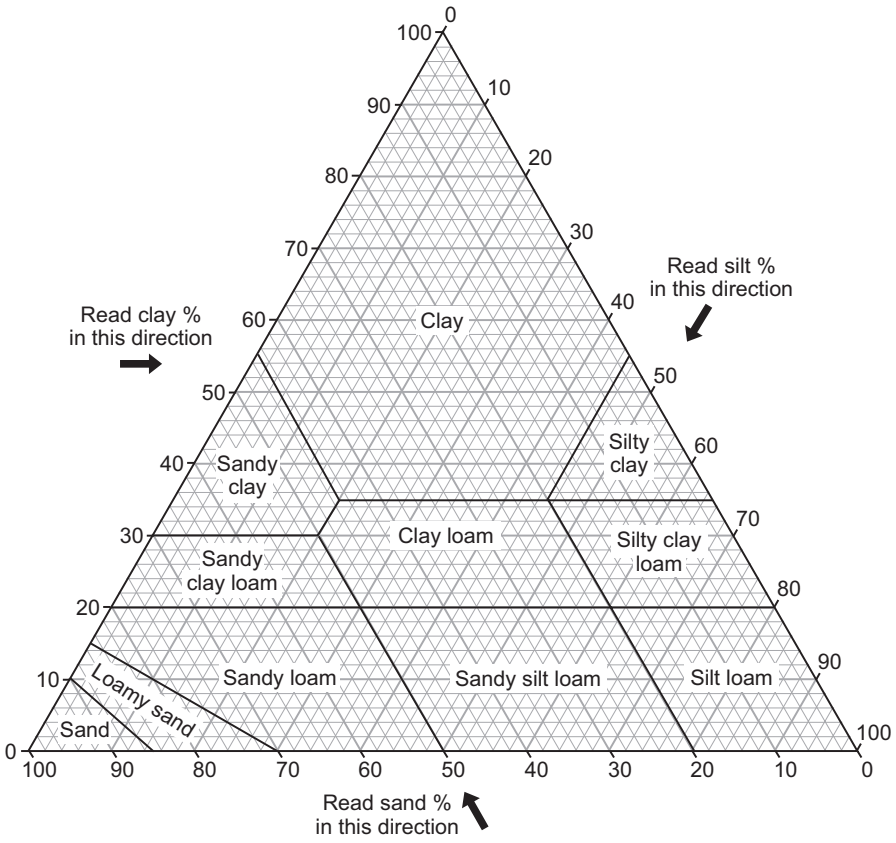
*(3 marks)*

**8 (c)** The diagram shows a soil triangle.




Shade the area of the graph where the soils have more than 30% sand but less than 40% clay. *(1 mark)*

**8 (d)** Describe how the texture of a soil affects its properties.

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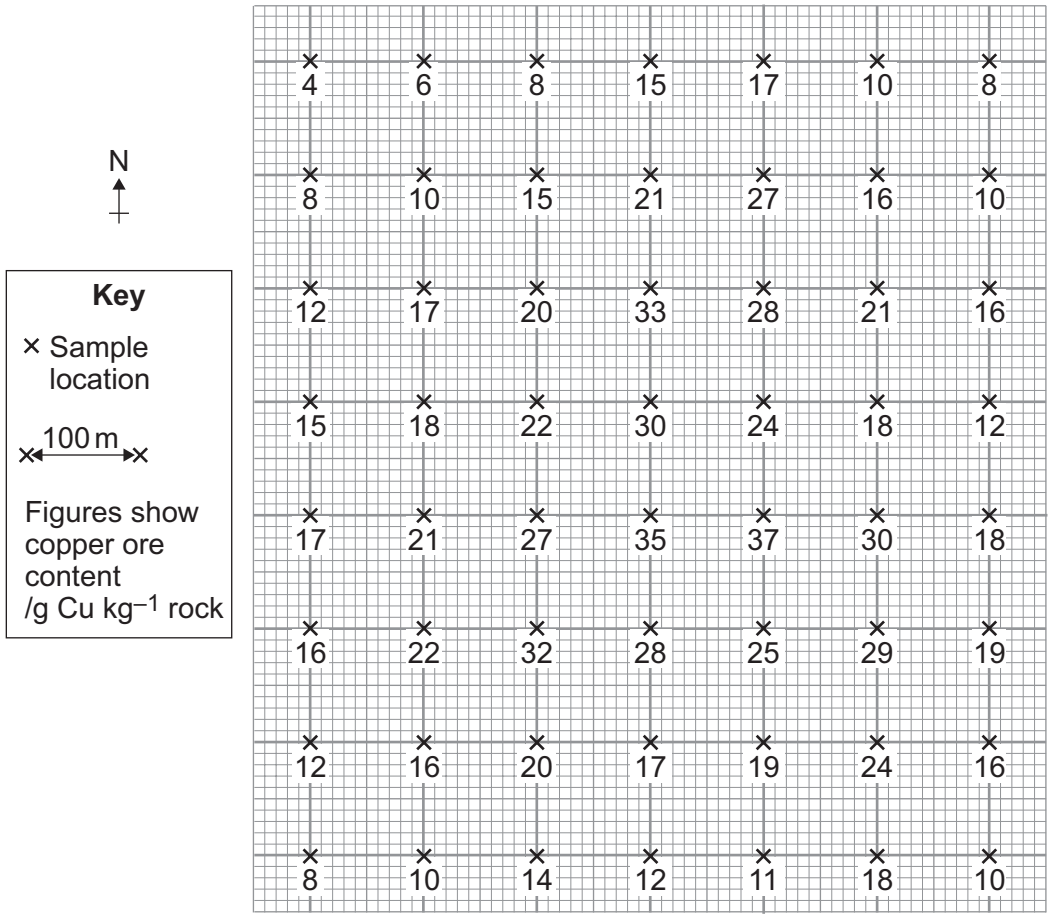
*(4 marks)*

**10**

**Turn over ▶**

**9** A geologist carried out trial drilling in an area to find out whether the copper ore deposits could be exploited commercially.

The map shows the results of the rock sample analysis.




**9 (a)** Draw a line on the map to surround the area that could be exploited if the cut-off ore grade is 25 g of copper per kg of rock. *(1 mark)*

**9 (b)** Outline the reasons why a mine may not be developed, even if rich ore deposits have been found.

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*(4 marks)*

**9 (c)** Describe the main processes that have produced deposits of minerals and rocks that may be exploited by humans.

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

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*(10 marks)*

15

**END OF QUESTIONS**