

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  
June 2012

# Environmental Studies

# ENVS2

## Unit 2 The Physical Environment

Tuesday 22 May 2012 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(b) should be answered in continuous prose.  
Quality of Written Communication will be assessed in this answer.



J U N 1 2 E N V S 2 0 1

**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 table lists some definitions of terms in the water cycle.

Complete the table by adding the appropriate letter from the list.  
The first row has been completed.

- A** Interception
- B** Catchment
- C** Percolation
- D** Residence time
- E** Abstraction
- F** Infiltration
- G** Aquifer
- H** Transfer rate

Definition	Letter
An underground rock structure from which water is abstracted	<b>G</b>
The average duration that a molecule remains in a reservoir	
The volume of material transferred from one reservoir to another per unit time	
Precipitation that is caught on vegetation	
The flow of water into the ground	
The movement of water between the particles of soil or rock	

(5 marks)

5
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**Turn over for the next question**

**Turn over ▶**



2 The table shows details of the atmosphere of the Earth, Mars and Venus.

Atmospheric feature	Unit	Earth with life	Earth if there had never been life	Mars	Venus
Surface temperature	°C	14	215	-23	467
Albedo	%	36	20	15	76
Atmospheric pressure at surface	Bar	1	1	0.007	92
CO <sub>2</sub>	% dry air	0.038	97	95.3	96.5
N <sub>2</sub>		78	1.9	2.7	3.4
O <sub>2</sub>		21	Trace	0.13	0.0

2 (a) Use the table to suggest why:

2 (a) (i) the Earth with life is so much cooler than if there had never been life

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 .....  
 (1 mark)

2 (a) (ii) the Earth, if there had never been life, would have been so much warmer than Mars.

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 .....  
 (1 mark)

2 (b) Explain why the carbon dioxide levels in the Earth's atmosphere have dropped so much since life developed.

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 (2 marks)



**2 (c)** Describe the process occurring in the Sun which provides energy for all planets in the solar system.

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(3 marks)

**2 (d)** Explain why little of the ultraviolet radiation from the Sun that arrives at the Earth's atmosphere reaches the Earth's surface.

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(1 mark)

**2 (e)** Outline **two** ways in which human activities alter the albedo of the Earth.

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(2 marks)

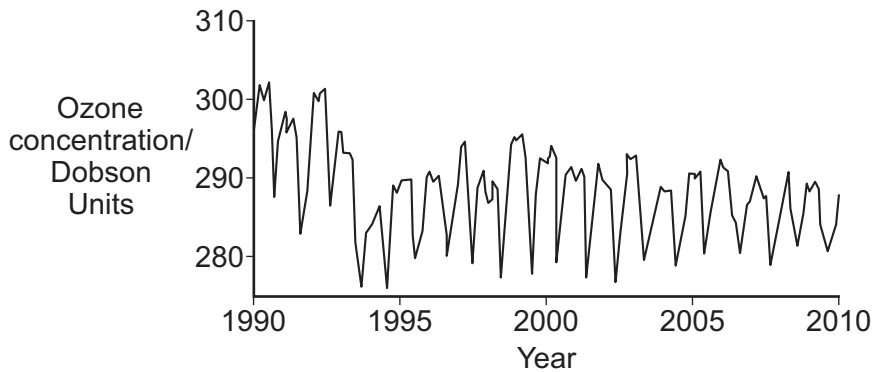
<b>10</b>

**Turn over for the next question**

**Turn over ▶**



**3** The graph shows the global trend in stratospheric ozone concentrations.



**3 (a)** Describe the trends shown by the graph.

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*(3 marks)*

**3 (b)** Use the graph to explain how the timing and frequency of data collection can affect the validity of the results.

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*(1 mark)*

**3 (c)** Name the main group of substances that has caused ozone depletion.

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*(1 mark)*



**3 (d)** Outline the chemical reactions that can cause ozone depletion.

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(2 marks)

**3 (e)** Describe the methods that have been used to tackle ozone depletion.

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(3 marks)

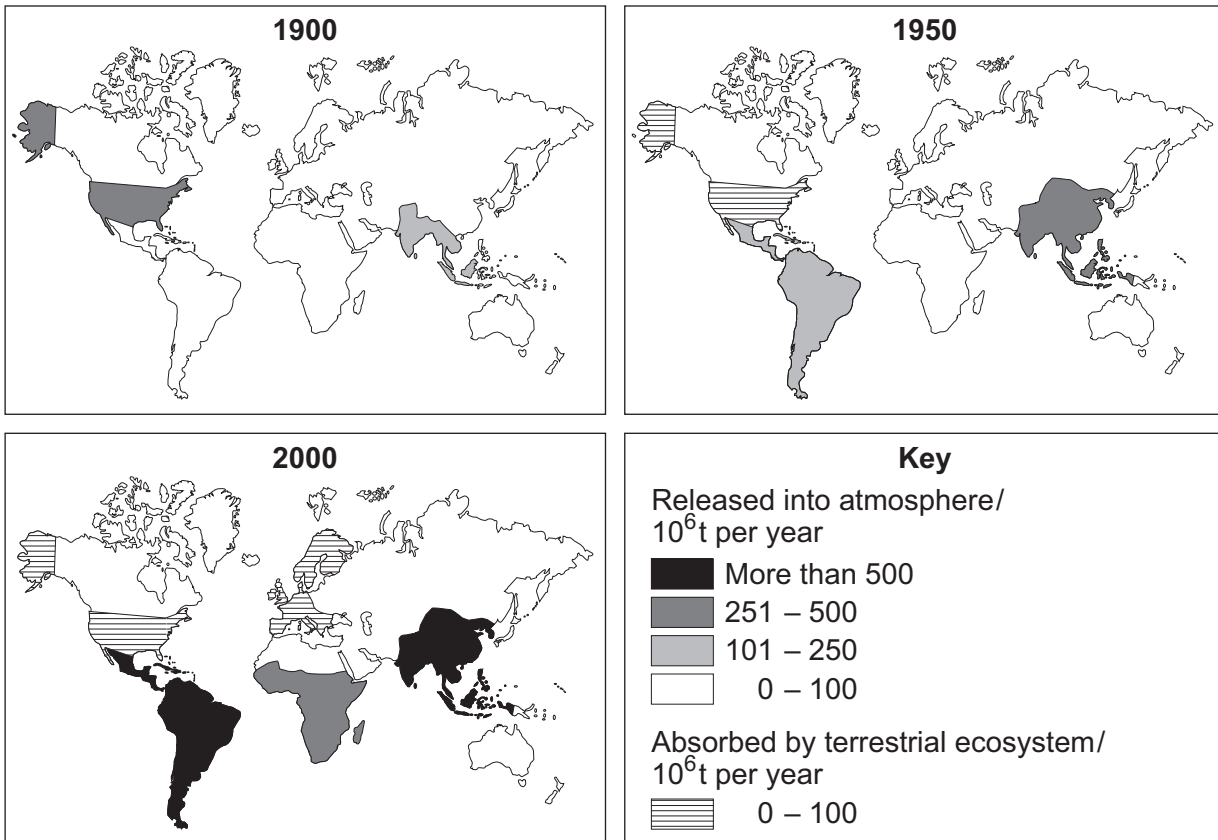
<b>10</b>

**Turn over for the next question**

**Turn over ▶**



4 The maps show the annual movements of carbon between the land and the atmosphere caused by the changes in land use in 1900, 1950 and 2000.



4 (a) Suggest how carbon exchange is likely to be affected by:

4 (a) (i) ploughing of farmland

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(2 marks)

4 (a) (ii) afforestation

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(2 marks)





4 (a) (iii) industrialisation.

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(2 marks)

4 (b) Environmental changes caused by humans can produce environmental responses that either increase or reduce the original change.

Explain how negative feedback mechanisms may affect rising CO<sub>2</sub> levels.

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(4 marks)

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Turn over for the next question

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5 Students investigated the risk of erosion and landslides on three mine spoil heaps. They assessed the texture of the soils by studying the sedimentation of samples in a measuring cylinder.

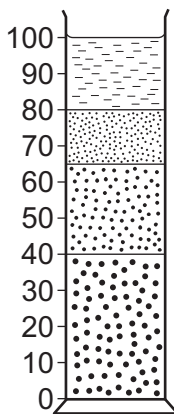
The table shows the sand, silt and clay composition of the soil samples.

Soil sample	Sand/%	Silt/%	Clay/%
A	50	20	30
B	60	35	5
C			

5 (a) Complete the table using the readings from the 100 cm<sup>3</sup> measuring cylinder shown below to calculate the percentages of sand, silt and clay in **Soil sample C**.

Show your working.

Soil Sample C



(3 marks)

5 (b) Which soil sample is likely to have:

5 (b) (i) the highest permeability

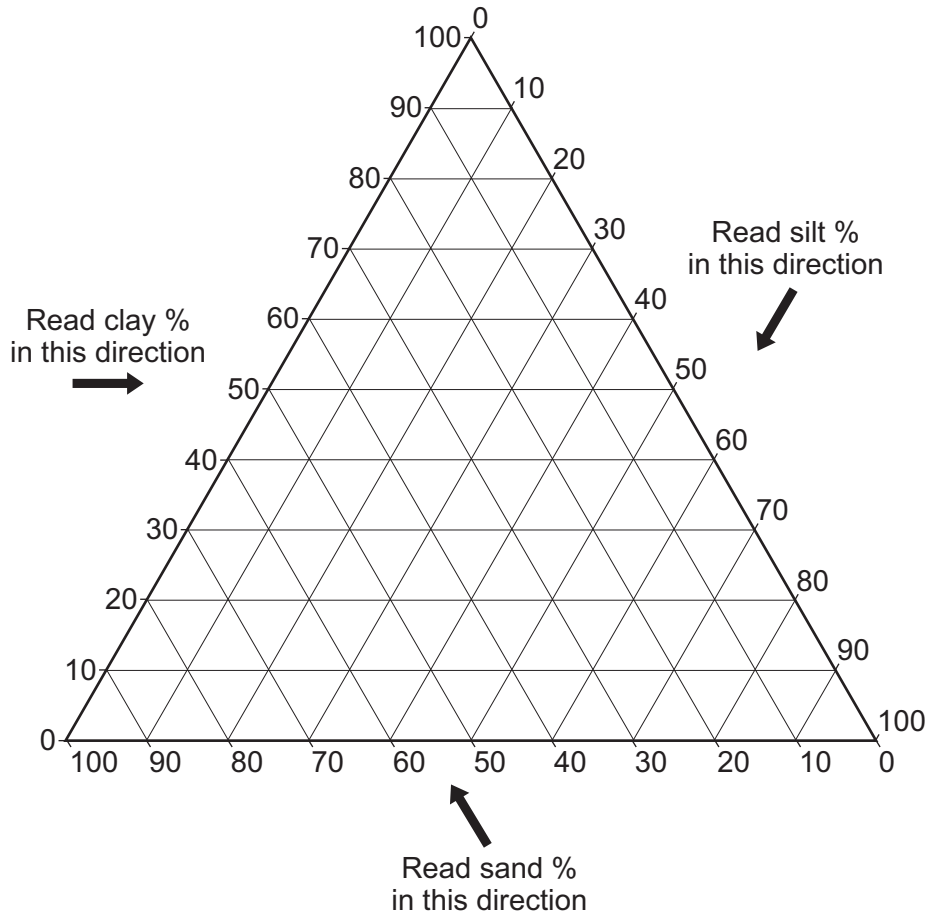
.....  
(1 mark)

5 (b) (ii) the highest nutrient level?

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(1 mark)



5 (c) Add an X to the soil triangle to represent Soil B.



(1 mark)

5 (d) Suggest how the risk of erosion on the spoil heaps may be reduced.

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(4 marks)

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Turn over ▶



**6** The photograph shows an abandoned copper mine where mining ended when the purity of the remaining accessible ore was too low.



**6 (a)** Describe a method that may be used to extend the operation of a mine by exploiting low grade ores.

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*(2 marks)*

**6 (b)** Explain why the exploitation of low grade ores is likely to affect the energy required to extract the metal.

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*(2 marks)*



**6 (c)** As the demand for minerals increases, new deposits must be found and mines developed.

Outline **two** features of a mine that may affect its viability.

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2.....  
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(4 marks)

**6 (d)** Outline how a change in the economy may cause the cut-off ore grade of a mineral to change.

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(2 marks)

<b>10</b>

**Turn over for the next question**

**Turn over ▶**



7 The photograph shows the spreading of nitrate fertiliser.



7 (a) Use the principle of dynamic equilibrium to explain why fertilisers are added to fields.

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(2 marks)

7 (b) Outline how the leaching of nutrients from fields may cause water pollution.

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(2 marks)

7 (c) Explain why phosphate fertilisers are less likely than nitrates to be leached from a field.

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(1 mark)



**7 (d)** Apart from the addition of fertilisers, explain how farming activities can affect the processes of the nitrogen cycle.

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(5 marks)

<b>10</b>

**Turn over for the next question**

**Turn over ▶**



**8** As part of an investigation into different plant communities, a student sampled soil from two areas of grassland in a nature reserve. The pH, water content and organic matter content of the soils were measured.

**8 (a)** Describe **one** method used to measure soil pH.

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(2 marks)

**8 (b)** The following method was used for each sample.

**Stage**

- 1** The soil sample was collected using a soil auger
- 2** The sample was placed in a plastic bag, sealed and placed in a refrigerator
- 3** The sample was weighed
- 4** The sample was heated at 100 °C and reweighed at regular intervals until it reached constant mass
- 5** The temperature was increased to between 200 °C and 500 °C and the sample was reweighed at regular intervals until it reached constant mass

The table shows the results.

	<b>Soil X</b>	<b>Soil Y</b>
Mass at <b>Stage 3</b>	26.7	9.25
Mass after <b>Stage 4</b>	21.2	6.35
Mass after <b>Stage 5</b>	19.4	5.55

**8 (b) (i)** Suggest **two** purposes for **Stage 2** of the method.

1.....

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2.....

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(2 marks)





**8 (b) (ii)** Explain why, in **Stage 5**, the soil was heated:

above 200°C.....

.....

below 500°C. ....

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(2 marks)

**8 (b) (iii)** Calculate the percentage water content of **Soil X**.

Water content .....%

(1 mark)

**8 (b) (iv)** Calculate the percentage organic matter content of dry **Soil Y**.

Organic matter content .....%

(1 mark)

**8 (b) (v)** Comment on the importance of using standardised techniques throughout any investigation.

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(2 marks)

**Turn over for the next question**

10

**Turn over ▶**



**9** The photographs show four aspects of water use in a Less Economically Developed Country (LEDC).



A girl collecting water for domestic use



Water sprays on a lawn in a nearby hotel



Irrigated greenhouses for growing flowers for export



Power station cooling towers that use river water

**9 (a)** Describe the ways in which water supply problems may affect the social and economic development of a country.

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(5 marks)





