Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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7	
8	
9	
TOTAL	

General Certificate of Education
Advanced Subsidiary Examination
June 2014

Environmental Studies ENVS2

Unit 2 The Physical Environment

Thursday 22 May 2014 1.30 pm to 3.00 pm

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.

A

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ANSWER IN THE SPACES PROVIDED

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

1 **Table 1** shows some details of six atmospheric gases.

Complete **Table 1**.

[5 marks]

Table 1

Gas	**Mean concentration in dry atmosphere / %**	**Example of major natural process that produces the gas**	**Example of human activity that causes increased atmospheric concentration**	**Example of process that causes large releases due to human activity**
Carbon dioxide		Aerobic respiration	Transport	
Nitrogen	78		None	None
Stratospheric ozone	0.000007	Interaction of oxygen and UV light	None	None
Tropospheric ozone	Up to 0.00004 in urban areas	No significant releases	Use of vehicles powered by petrol (or diesel)	Breakdown of NO_x and reaction of products with oxygen
Oxygen	21		None	None
Methane	0.00017	Anaerobic digestion by bacteria		Anaerobic digestion by bacteria

5

Turn over for the next question

2 **Figure 1** shows a reservoir that stores water pumped from the River Thames to be used for public supply.

Figure 1

2 (a) Outline **two** ways that the storage of river water in a reservoir reduces the need for further treatment.

[4 marks]

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2 (b) (i) Explain how very large reservoirs may alter the temperature extremes in the surrounding area.

[2 marks]

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2 (b) (ii) Outline **two other** ways that very large reservoirs may change the microclimate downwind.

[4 marks]

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Turn over for the next question

3 **Figure 2** shows the energy used to extract copper from ores of different purities.

Figure 2

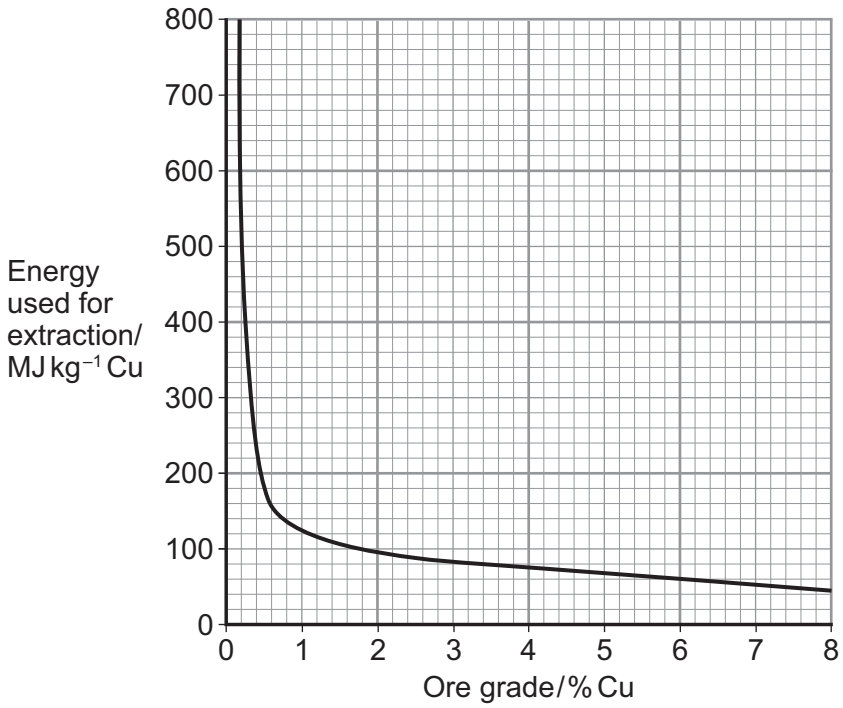

Table 2 shows the average copper content in ores mined in Australia.

Table 2

Date	**Average copper content of ores / % Cu**
1900	7.60
1950	1.35
2010	0.95
2050 (prediction)	0.60

3 (a) Suggest **one** reason why the energy used for extraction increases as the ore grade declines.

[1 mark]

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3 (b) Use the information in **Figure 2** and **Table 2** to calculate the predicted percentage change in the energy used to extract copper from its ore between 1900 and 2050. Show your working.

[2 marks]

.....% change

3 (c) Describe **one** method that is used to extract metals from low grade ores.

[2 marks]

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3 (d) Exploratory drilling to search for new deposits is very expensive.

Describe **one** method that is used to find the areas where drilling may be worthwhile.

[2 marks]

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3 (e) Suggest why an increase in the market price may change the cut-off ore grade of a mineral.

[3 marks]

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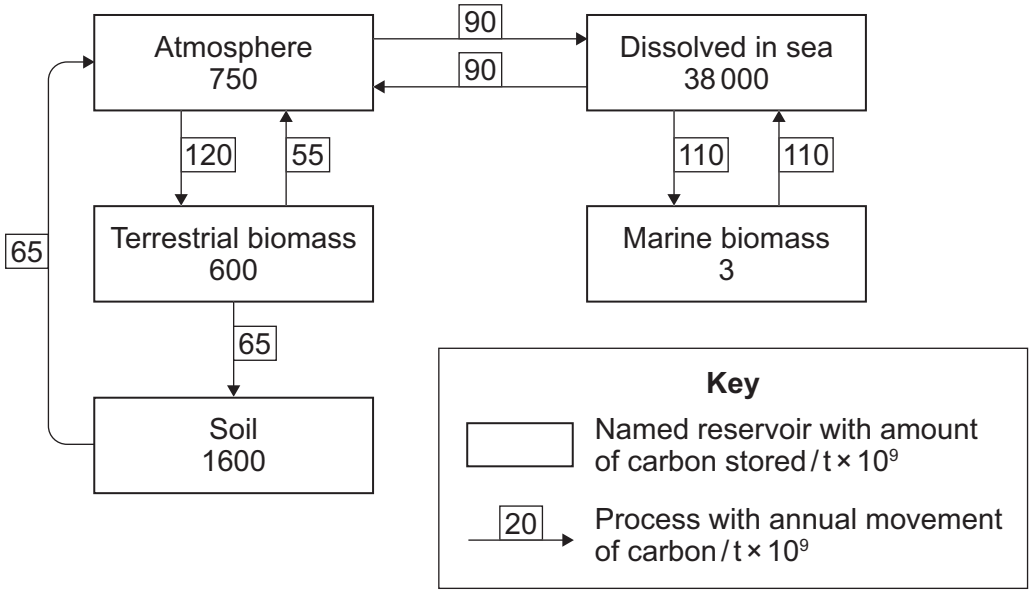
4 **Figure 3** shows part of a simplified carbon cycle in a state of dynamic equilibrium.

Figure 3



4 (a) Calculate the residence time for carbon dissolved in the sea, using the formula:

$$\text{residence time} = \frac{\text{amount in the reservoir}}{\text{annual movement in or out of the reservoir}}$$

[1 mark]

.....years

4 (b) Suggest how human activities have changed the amount of carbon moving:

4 (b) (i) from the soil to the atmosphere

[2 marks]

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4 (b) (ii) from the atmosphere to the terrestrial biomass.

[2 marks]

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4 (c) Describe the role of negative feedback mechanisms in resisting both increases and decreases in atmospheric carbon dioxide concentrations.

[5 marks]

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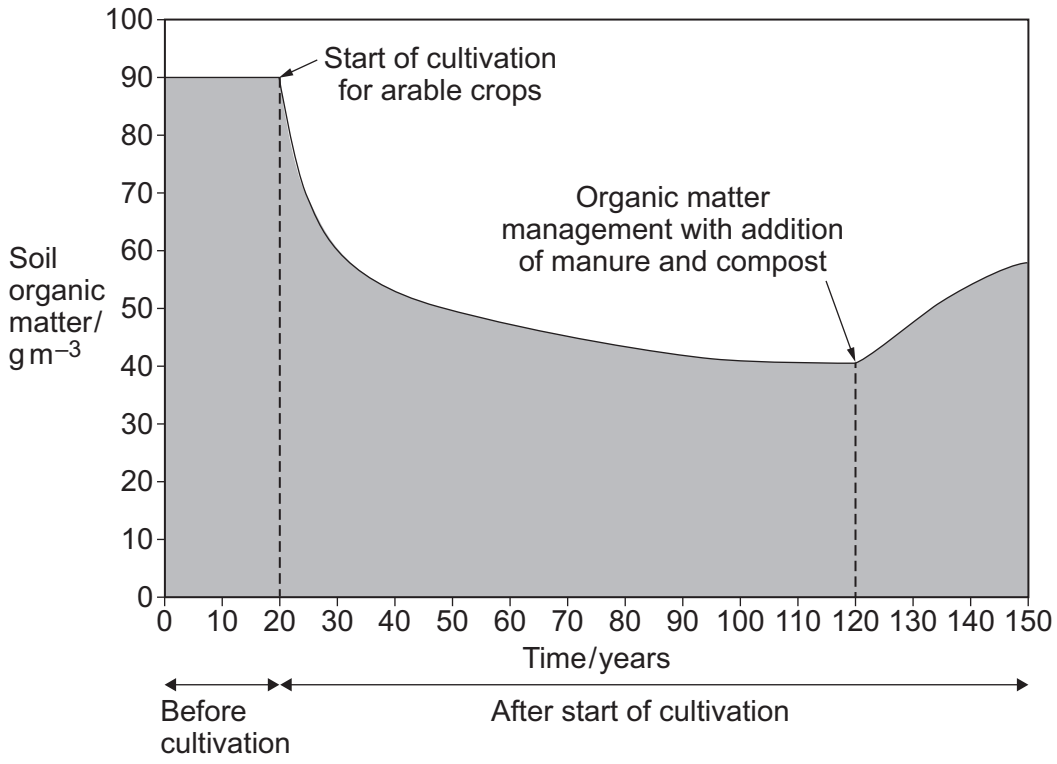
Turn over for the next question

5 **Figure 4** shows the organic matter content of soil in a field over a 150 year period.

Figure 4



5 (a) Explain why the organic matter content changed between year 20 and year 120.

[3 marks]

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5 (b) The organic matter content of a soil affects its water content.

Describe **one** laboratory technique that may be used to measure the water content of a soil.

[3 marks]

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5 (c) Suggest how the timing of the collection of the soil samples should have been planned to ensure that the results were representative of the normal conditions in the field.

[4 marks]

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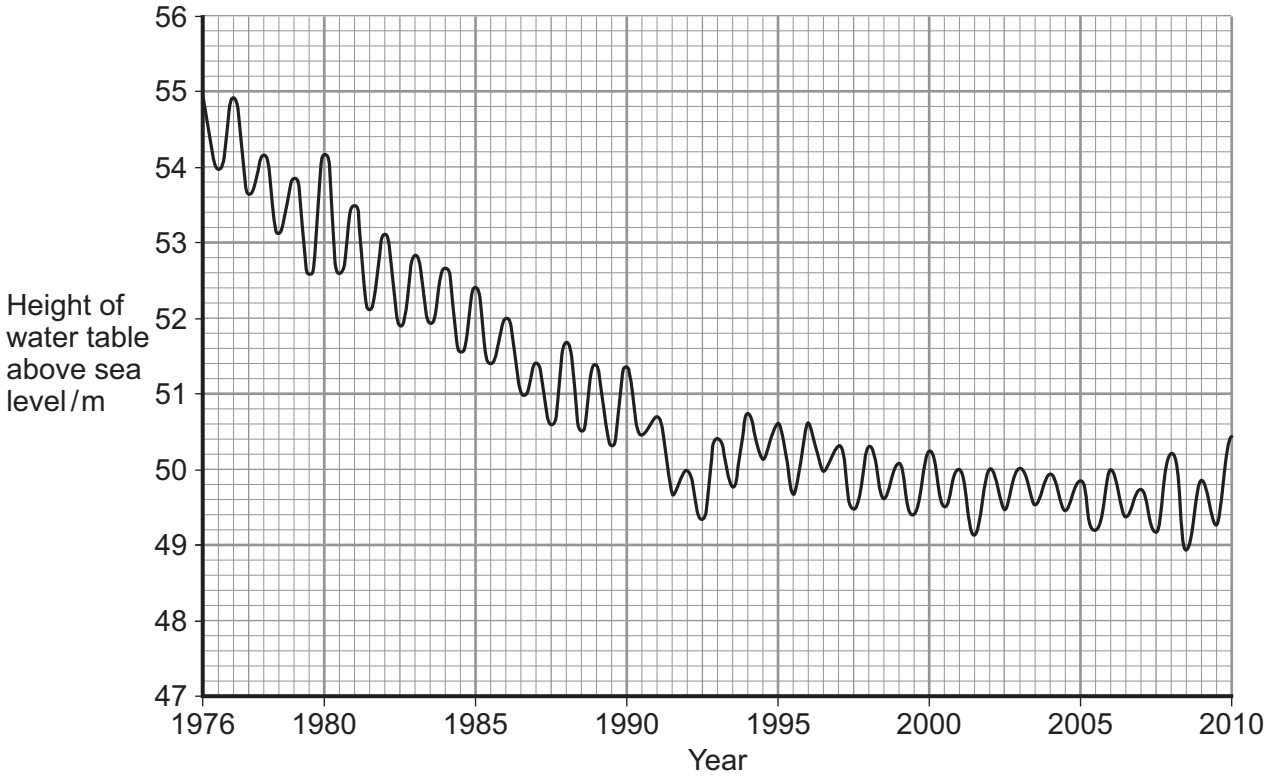
Turn over for the next question

6 **Figure 5** shows the changing level of the water table in an aquifer between 1976 and 2010.

Figure 5



6 (a) (i) Describe **two** trends shown by the graph (**Figure 5**).

[2 marks]

Trend 1 .....

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Trend 2 .....

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6 (a) (ii) Suggest reasons for these trends.

[2 marks]

Trend 1 .....

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Trend 2 .....

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6 (b) **Figure 6** is an aerial photograph that shows circular areas in the Sahara Desert that have been irrigated using groundwater. The darker areas are still being cultivated while the paler areas have been abandoned.

Figure 6

Source:Getty Images

Suggest why the long-term use of groundwater for irrigation may make the cultivation of some areas impossible.

[2 marks]

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Question 6 continues on the next page

6 (c) Explain why increasing the availability of treated water for domestic use in Less Economically Developed Countries (LEDCs) may increase social and economic development.

[4 marks]

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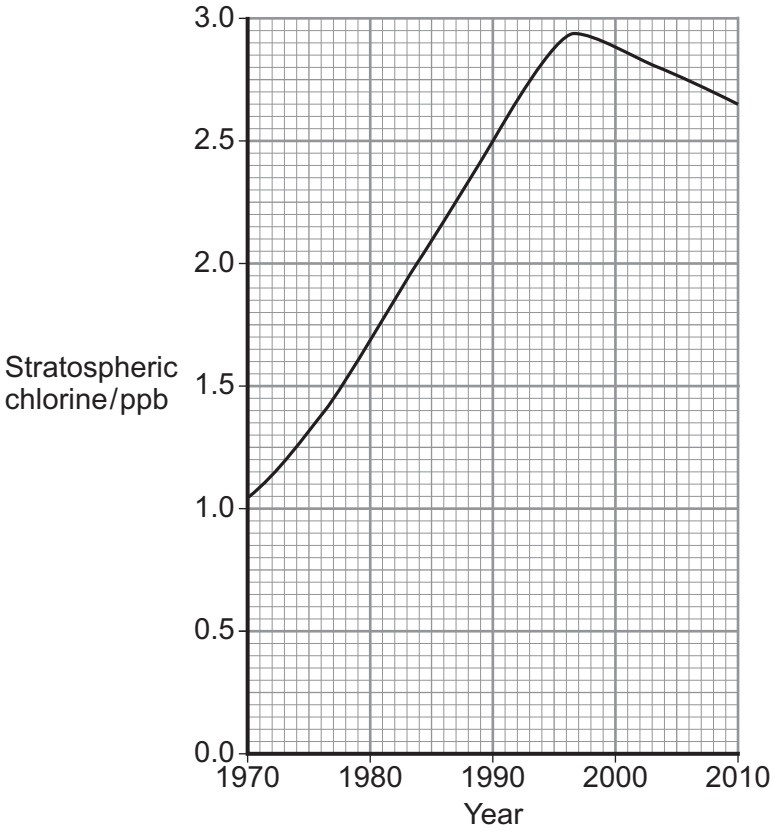
7 **Figure 7** shows changes in the concentration of chlorine in the stratosphere between 1970 and 2010.

Figure 7



7 (a) Explain why an increased chlorine concentration in the stratosphere is a threat to human health.

[2 marks]

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7 (b) Suggest why the chlorine concentration in the stratosphere rose.

[2 marks]

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7 (c) Describe the human actions that have resulted in declining chlorine concentrations.

[6 marks]

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Turn over for the next question

8 The photographs in **Figure 8** show a range of methods used to reduce the environmental problems caused by mining.

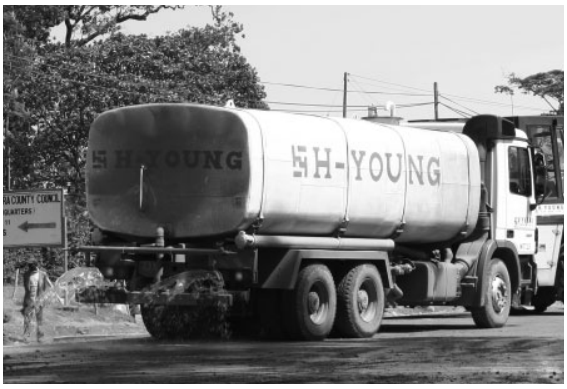
Figure 8

Sedimentation lagoon

Tree planting on a spoil heap

Baffle mound

Water spraying



8 (a) Describe how **each** of these methods reduces environmental problems.

8 (a) (i) Sedimentation lagoons

[2 marks]

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8 (a) (ii) Tree planting on spoil heaps

[2 marks]

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8 (a) (iii) Baffle mounds

[2 marks]

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8 (a) (iv) Water spraying

[2 marks]

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8 (b) Outline **one** method that may be used to measure the pH of mine drainage water.

[2 marks]

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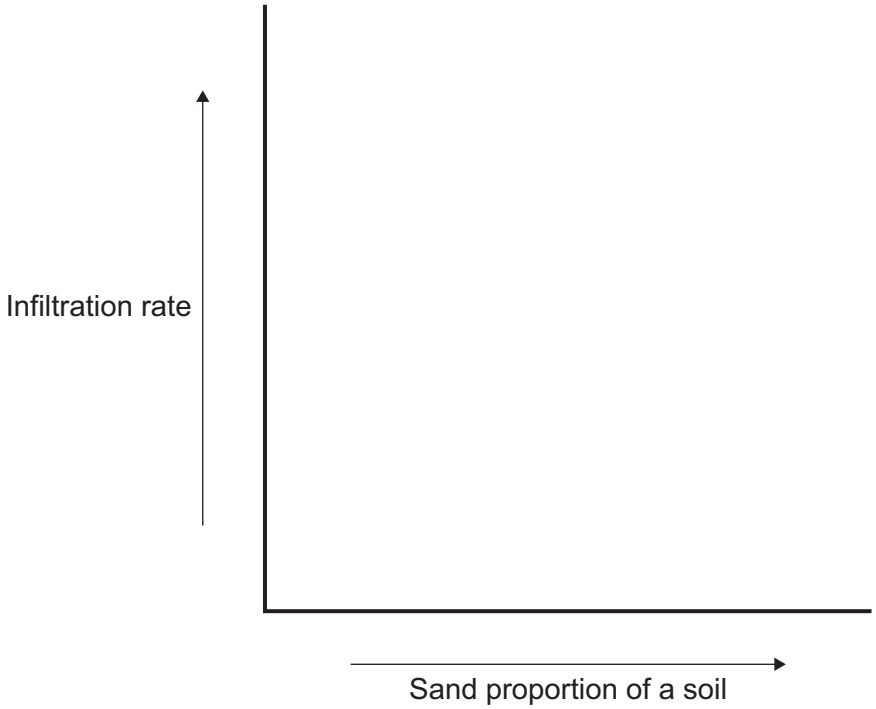
Turn over for the next question

9 (a) The sand content of a soil affects many important properties.

Draw a line on the graph (**Figure 9**) to show how the proportion of sand in a soil affects the infiltration rate of a soil.

[1 mark]

Figure 9



9 (b) Describe **one** method that may be used to extract living organisms from a soil sample.

[4 marks]

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9 (c) Living organisms contribute to soil fertility.
Describe how the soil conditions may be controlled to help living organisms produce a fertile soil.

You should answer this question in continuous prose.
Quality of Written Communication will be assessed in this answer.

[10 marks]

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Extra space for question 9(c) .....

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15

END OF QUESTIONS

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