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 2011

Environmental Studies ENVS2

Unit 2 The Physical Environment

Thursday 19 May 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 table shows a range of rocks and minerals, and the geological processes that may have produced them.

Put a tick in **one** box of **each** row of the table to show how the rocks and minerals were formed.

Rocks and minerals	**Geological processes**				
	Igneous	**Sedimentary alluvial/placer**	**Sedimentary biological**	**Sedimentary evaporite**	**Metamorphic**
Coal					
Halite (sodium chloride salt)					
Slate					
Hydrothermal copper ore					
Gravel					

(5 marks)

5

Turn over for the next question

2 The photograph shows the bed of a lake that has dried up due to overexploitation of the groundwater.

2 (a) With reference to the natural water level of an aquifer, explain the meaning of dynamic equilibrium.

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(2 marks)

2 (b) Name **two** rocks that often form aquifers.

1 .....

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2 .....

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(2 marks)

2 (c) Explain how the porosity and permeability of a rock affect its suitability to form an aquifer.

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(4 marks)

2 (d) Explain how overexploitation can cause the salinisation of an aquifer.

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(2 marks)

10

Turn over for the next question

3 The photograph shows a plantation of *Grevillea robusta* trees in Africa that have nitrogen-fixing bacteria on their roots.

3 (a) Outline **two** other ways in which bacteria are involved in the nitrogen cycle.

1 .....

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2 .....

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(2 marks)

3 (b) State **one** biological role of nitrogen in plants.

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(1 mark)

3 (c) A student collected soil samples to assess the fertility of the soil in a field.

Suggest the ways that the collection of samples should have been planned to ensure that the results were reliable.

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(5 marks)

3 (d) In the context of biogeochemical cycles, explain why phosphorus is cycled more slowly than nitrogen.

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(2 marks)

10

Turn over for the next question

4 The table gives details of the emissions of some of the greenhouse gases, released by human activities, which cause global climate change.

Activity	Gas (figures show % of total contribution)					
	CO_2	CH_4	CFCs	NO_x	Others	Total
Fossil fuel extraction, transport and use	43	3		2		48
CFC use			25			25
Biomass combustion	14					14
Rice padi fields		3				3
Livestock farming		3				3
Use of nitrogen fertilisers				2		2
Landfill sites		1				1
Others				1	3	4
Total	**57**	**10**	**25**	**5**	**3**	**100**

4 (a) (i) Describe how methane is released by fossil fuel use.

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(1 mark)

4 (a) (ii) Describe the process that releases methane from rice padi fields, livestock farming and landfill sites.

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(2 marks)

4 (b) Describe the methods that have been used to reduce the releases of methane.

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(4 marks)

4 (c) Describe **one** pollution problem caused by CFCs which threatens human health.

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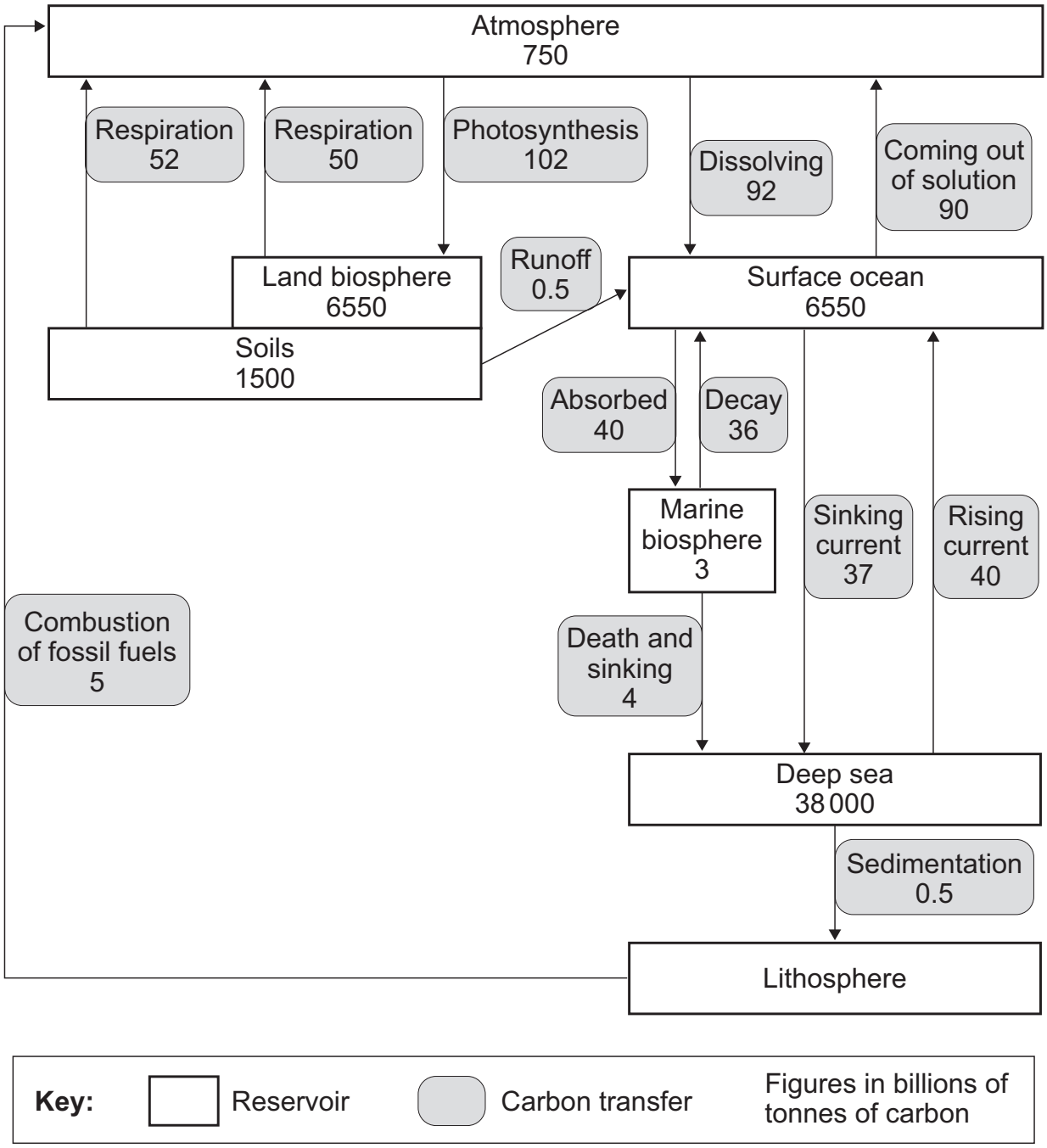
(3 marks)

10

Turn over for the next question

5 The diagram shows some features of the carbon cycle.



5 (a) Name the substance that contains a major part of the carbon in **each** of the following.

5 (a) (i) Lithosphere

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(1 mark)

5 (a) (ii) Dissolved in the oceans

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(1 mark)

5 (a) (iii) Biosphere

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(1 mark)

5 (b) The data in the diagram show that the amount of carbon in the atmosphere is increasing. Growing more trees could help to reduce this.

Calculate the mass of extra carbon that trees would have to absorb to stabilise atmospheric concentrations.

.....billions of tonnes of carbon

(1 mark)

5 (c) Describe a practical method to estimate the percentage of organic matter in a soil sample.

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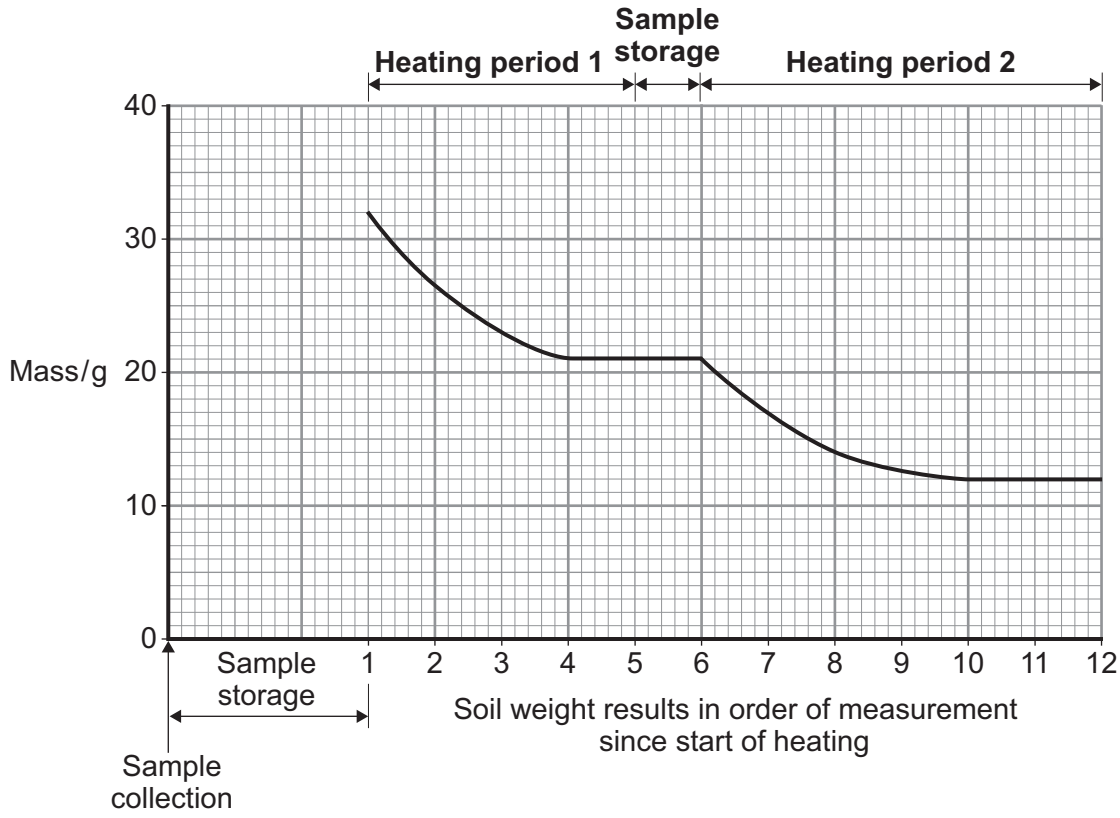
(6 marks)

6 The graph shows the mass of a soil sample from a series of weighings in an experiment to estimate its water and organic matter contents.



6 (a) Outline **one** method to ensure that the soil mass did not change between its original collection and the first time that it was weighed.

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(1 mark)

6 (b) Which is the first weight that can be used to estimate the water content of the soil sample?

Soil weight number .....

(1 mark)

6 (c) Estimate the mass of organic matter in the soil sample.
Show your working.

..... g
(2 marks)

6 (d) Suggest suitable temperatures for:

6 (d) (i) Heating period 1 ..... °C
(1 mark)

6 (d) (ii) Heating period 2 ..... °C
(1 mark)

6 (e) Explain how the water content of soil may affect the organic matter content of the soil.

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(4 marks)

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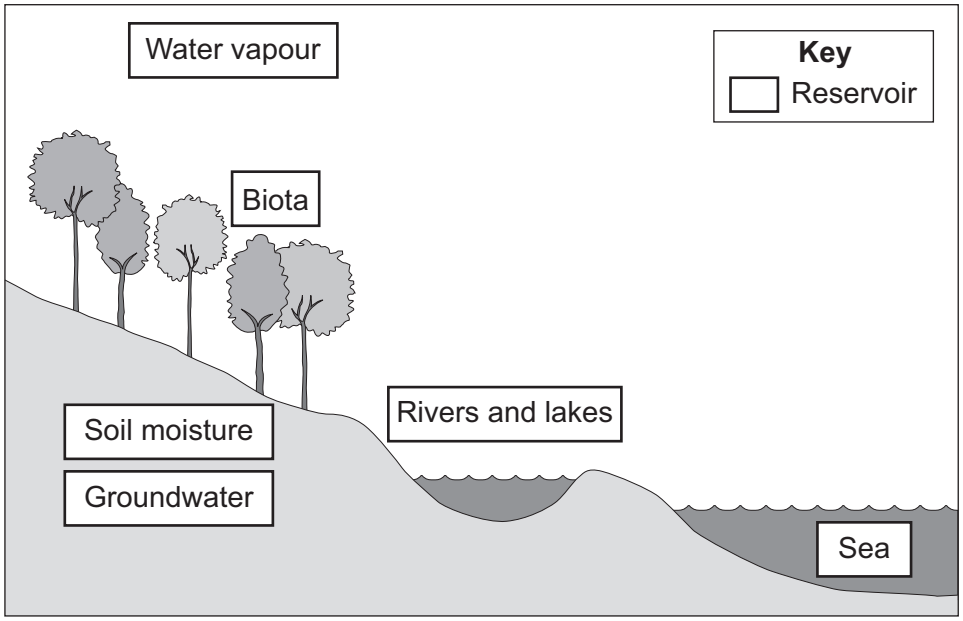
Turn over for the next question

7 The diagram shows some features of the hydrological cycle.



7 (a) Outline **two** ways in which vegetation affects the amount of water in the reservoirs of the water cycle.

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2 .....

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(2 marks)

7 (b) Explain why the change in the density of water as it cools to 0 °C allows life to survive in lakes.

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(2 marks)

7 (c) Suggest how the water content of soil may affect its fertility.

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(2 marks)

7 (d) Explain how the texture of a soil may affect its properties.

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(4 marks)

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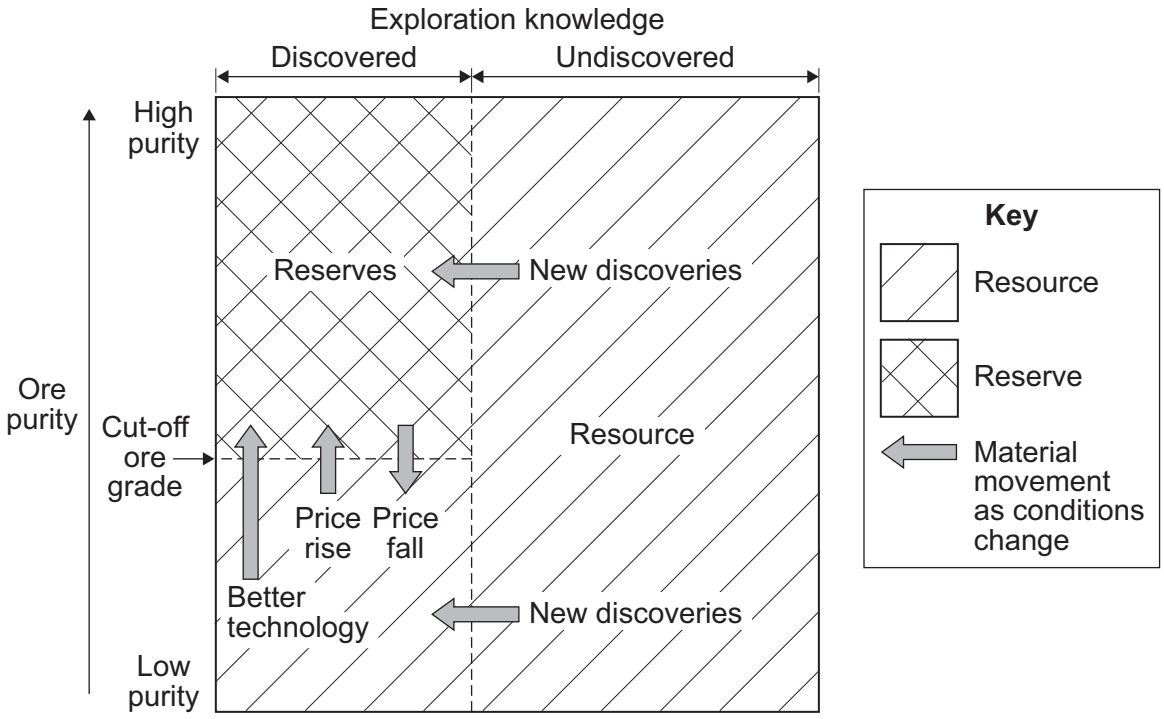
Turn over for the next question

8 The diagram shows how changes in market price and technology affect the quantity of a mineral in its reserves and resource.



8 (a) Explain the meaning of the following in terms of quantity and viability of exploitation.

8 (a) (i) Resource

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(2 marks)

8 (a) (ii) Reserves

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(2 marks)

8 (b) How would the 'cut-off ore grade' change if market prices rise?

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(1 mark)

8 (c) Outline **one** way that improved technology may be used to exploit low grade ores.

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(2 marks)

8 (d) Outline **one** method that may be used to measure the pH of the drainage water from a mine spoil heap.

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(3 marks)

10

Turn over for the next question

9 The photograph shows part of an urban area.

9 (a) Suggest how changing the albedo of the roofs of buildings and ground surfaces in urban areas may be used to moderate local temperatures.

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(2 marks)

9 (b) Suggest how changing the permeability of urban surfaces may reduce the problems caused by heavy rainfall.

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(3 marks)

9 (c) Describe the ways that global climate change is likely to cause changes in weather patterns and ocean currents.

Quality of Written Communication will be assessed in this answer.

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(10 marks)

15

END OF QUESTIONS