Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

General Certificate of Education
Advanced Subsidiary Examination
June 2013

Environmental Studies ENVS2

Unit 2 The Physical Environment

Thursday 23 May 2013 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(b) should be answered in continuous prose.
  Quality of Written Communication will be assessed in this answer.

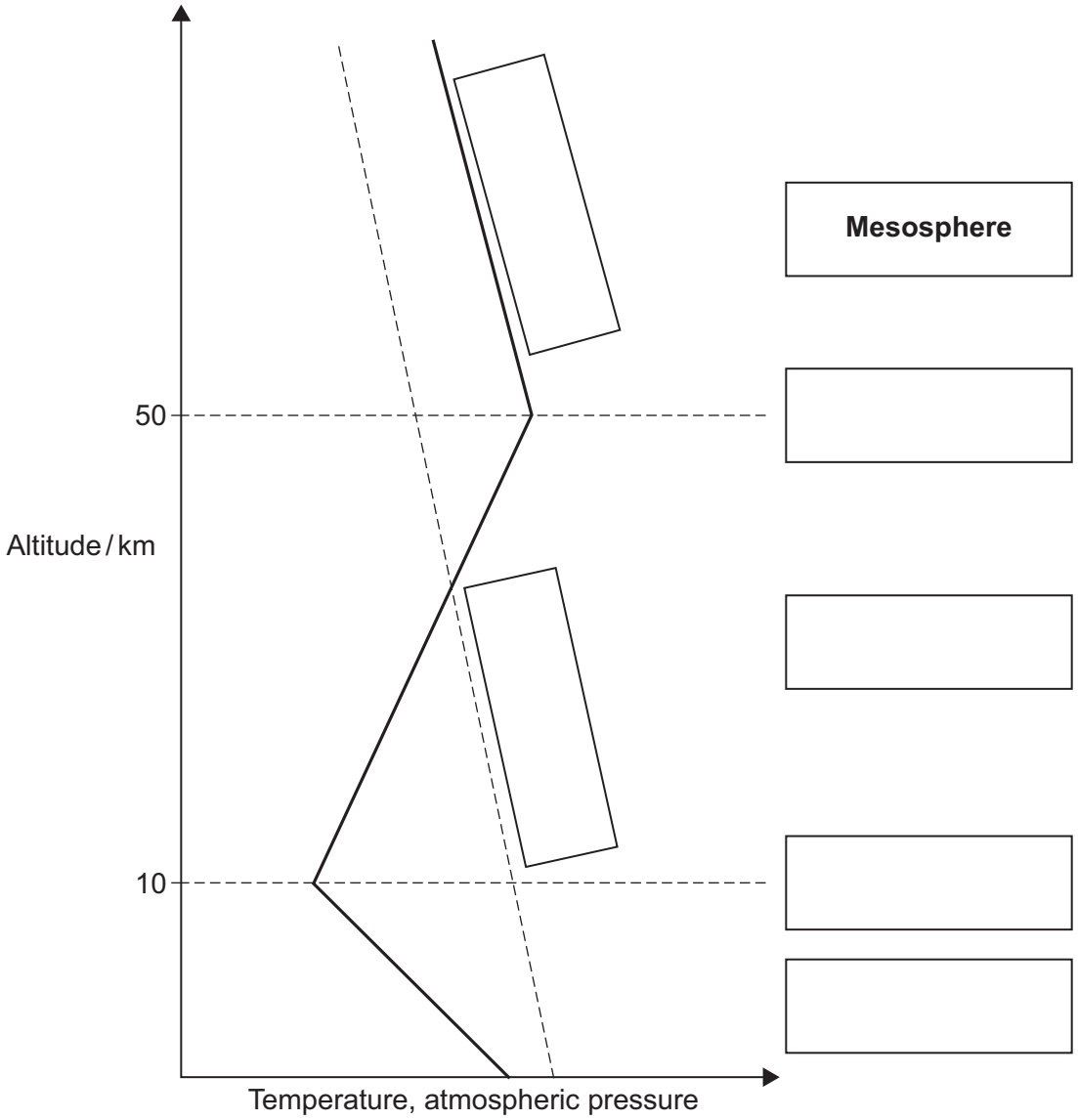
A

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

1 (a) The diagram shows the structure of the atmosphere.

Complete the diagram by adding the correct labels from the list below.

Troposphere
Lithosphere
Stratosphere
Mesopause
Tropopause
Stratopause
Temperature
Atmospheric pressure
Ozone concentration



(3 marks)

1 (b) Outline the process that releases energy in the sun.

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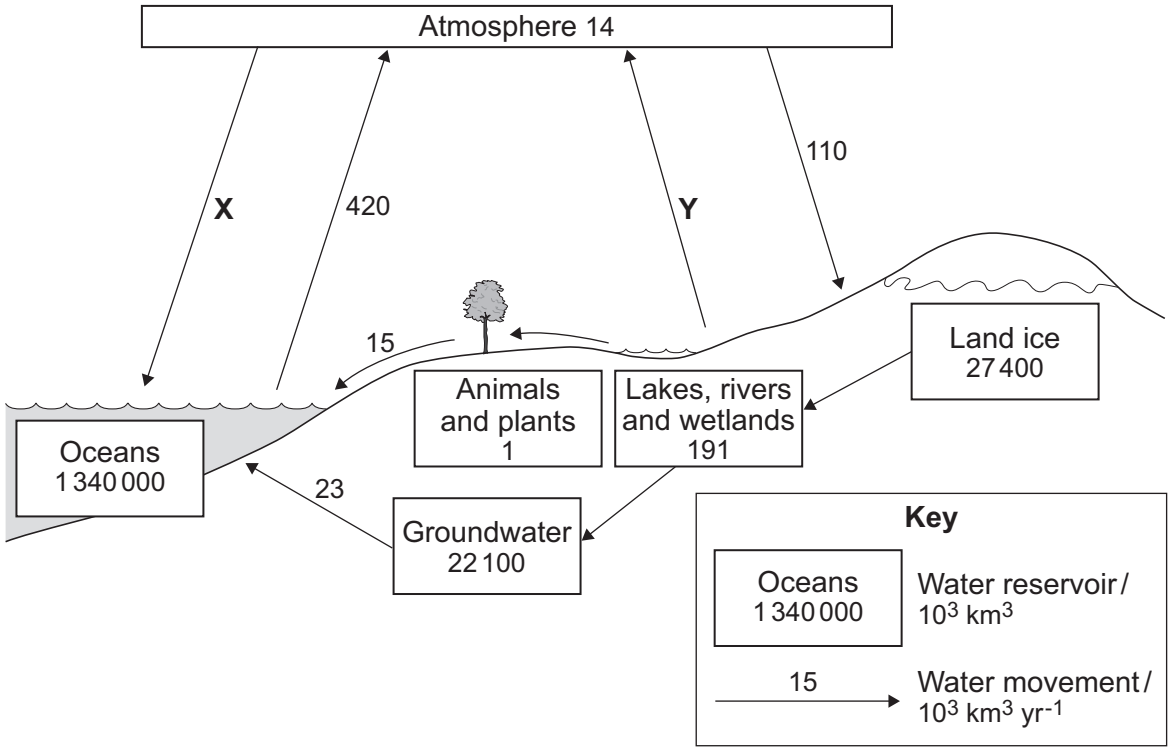
(2 marks)

5

Turn over for the next question

2 The diagram shows the hydrological cycle in a state of dynamic equilibrium.



2 (a) (i) Calculate the missing values, **X** and **Y**, on the diagram.

X ……

Y ……
(2 marks)

2 (a) (ii) Calculate the Residence Time for water in the **oceans** using the formula

$$\text{Residence time} = \frac{\text{Volume of water in reservoir}}{\text{Annual flow rate in or out of reservoir}}$$

…….. years
(1 mark)

2 (b) Explain the difference between:

2 (b) (i) infiltration and percolation

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(2 marks)

2 (b) (ii) porosity and permeability.

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(2 marks)

2 (c) (i) Name **two** human activities that add large amounts of water vapour to the atmosphere.

1 .....

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2 .....

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(2 marks)

2 (c) (ii) Suggest why this extra water vapour does not produce a long-term increase in atmospheric water vapour.

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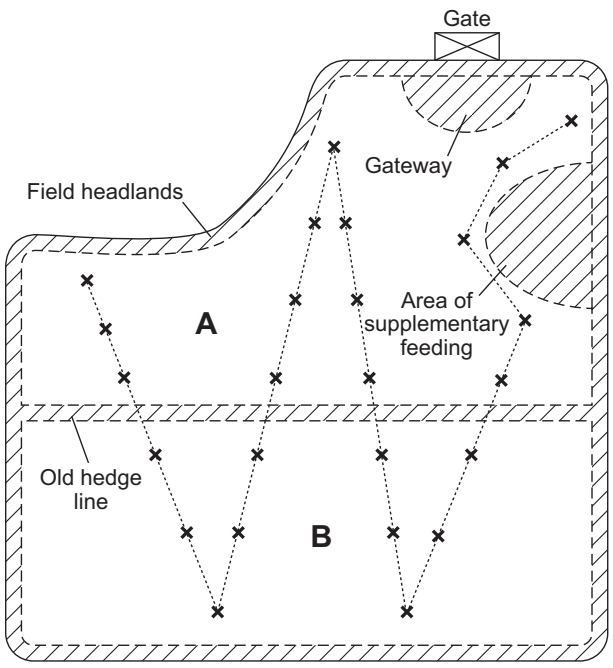
(1 mark)

10

3 The diagram shows a sampling pattern that Natural England recommends to farmers for the collection of soil samples.



Areas **A** and **B** should be sampled separately if they have been farmed differently in the recent past, or if they have different soil types.

At each sampling site, 25 cores should be taken and mixed together, from which a sub-sample is taken.

Atypical areas should be avoided, such as sites of old bonfires, manure heaps, under pylons, around trees, and supplementary livestock feeding areas.

Key

Route taken

× Sub-sample points

Areas excluded from sampling

Source: adapted from Natural England Technical Information Note TIN035
Natural England, Foundry House, Sheffield S3 8NH

3 (a) Explain why this recommendation should give results that are representative of the whole field.

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(4 marks)

3 (b) Outline **two** other precautions that should be taken to ensure that the results from different sites may be compared with one another.

1 .....

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2 .....

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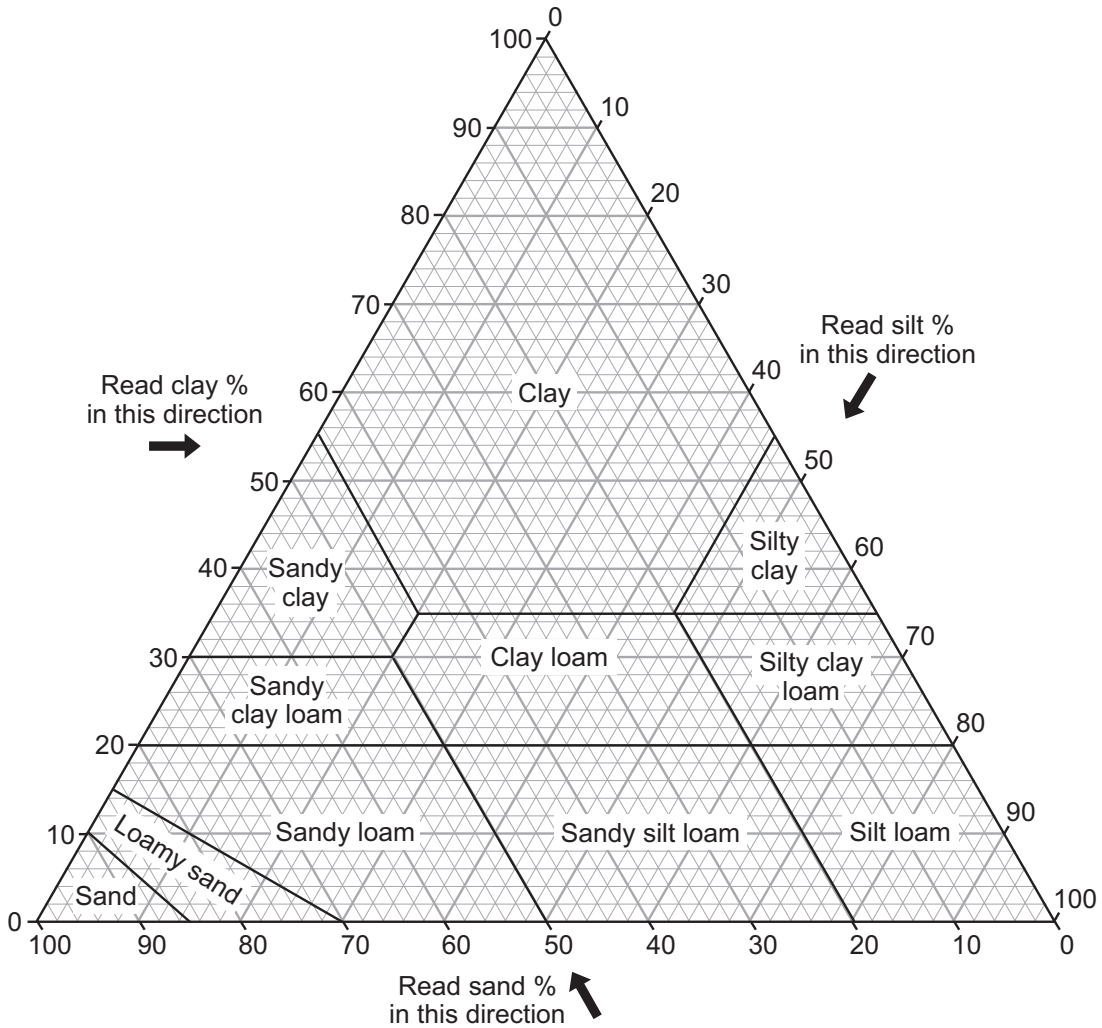
(4 marks)

Question 3 continues on the next page

3 (c) The graph shows the proportions of sand, silt and clay in different types of soil.



3 (c) (i) What is the highest possible silt content in a clay loam soil?

…….. %
(1 mark)

3 (c) (ii) What is the range of sand content found in sandy clay soils?

…….. %
(1 mark)

10

Turn over for the next question

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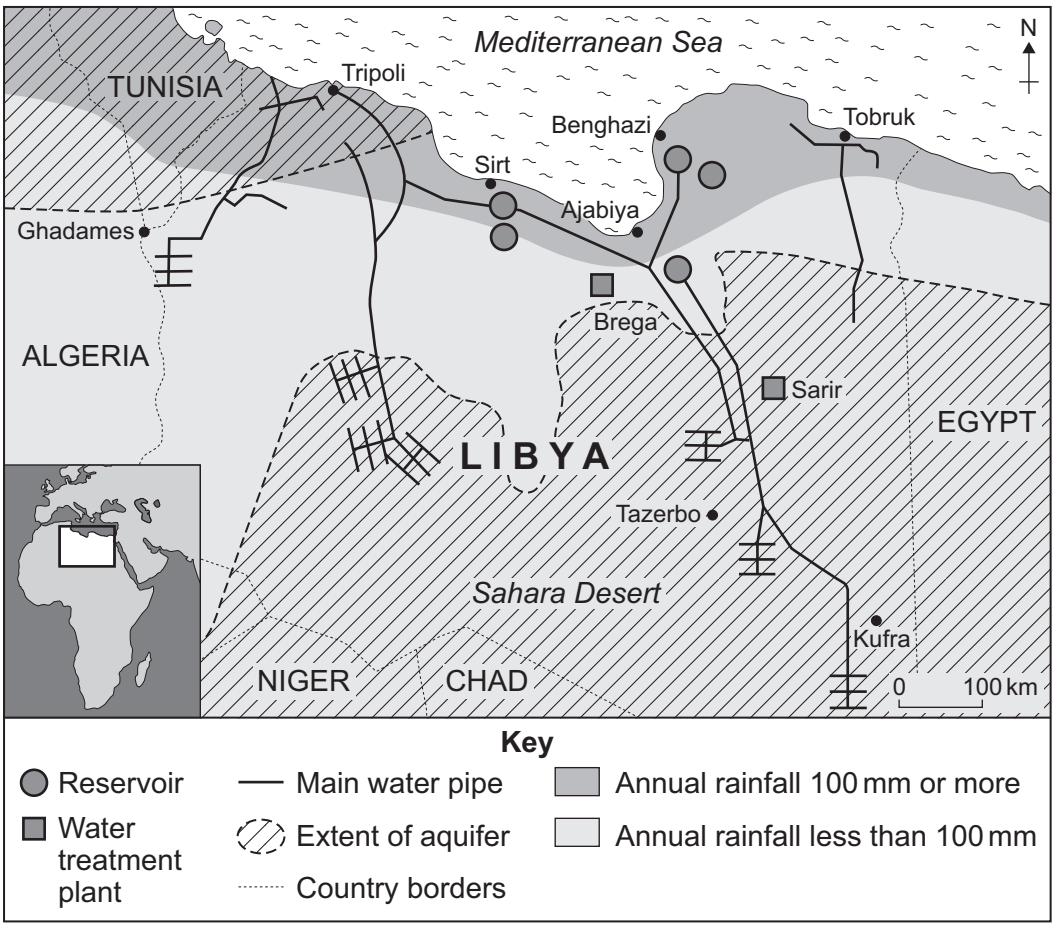
4 A project began in Libya in 1984 to exploit the huge aquifer under the desert in North Africa. The water entered the aquifer when the climate was wetter, between 15 000 and 38 000 years ago. The current aquifer recharge rate is very low because the climate is now very dry and it rarely rains.

The map shows the aquifers in Libya and associated developments.



4 (a) Name **one** rock that often forms aquifers.

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(1 mark)

4 (b) Outline the properties of a rock that make it suitable to form aquifers.

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(2 marks)

4 (c) Suggest why the overexploitation of the aquifer near Tripoli has caused the aquifer to become contaminated with salt water.

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(2 marks)

4 (d) Outline **one** advantage of exploiting aquifer water rather than desalinating seawater.

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(1 mark)

4 (e) Explain why river water usually requires more treatment than aquifer water to make it potable.

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(4 marks)

10

Turn over for the next question

5 The photograph shows an open-cast mine.

5 (a) Outline methods that may be used to reduce the environmental problems caused by:

5 (a) (i) machinery noise

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(2 marks)

5 (a) (ii) dust.

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(2 marks)

5 (b) Outline **two** other ways in which open-cast mining causes more environmental damage than deep mining.

1 .....

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2 .....

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(4 marks)

5 (c) Describe **one** method that may be used to measure the pH of mine drainage water.

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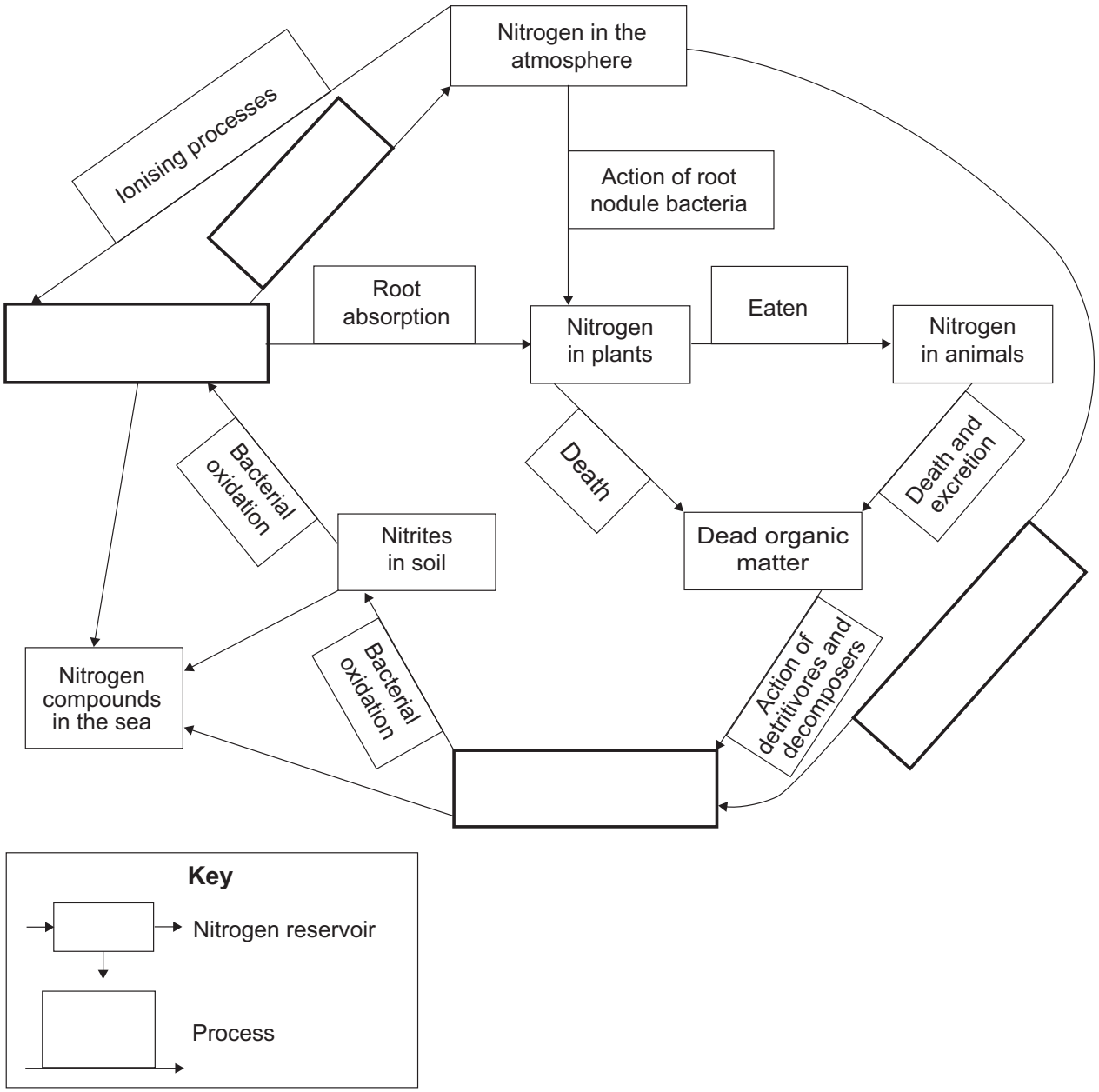
(2 marks)

10

Turn over for the next question

6 (a) The diagram shows the nitrogen cycle.

Complete the diagram by filling in the missing processes and reservoirs.



(4 marks)

6 (b) Outline how the following human activities alter the processes of the nitrogen cycle.

6 (b) (i) Drainage of farmland

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(2 marks)

6 (b) (ii) Cultivation of legumes, such as peas and beans

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(2 marks)

6 (b) (iii) Removal of harvested crops from fields

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(2 marks)

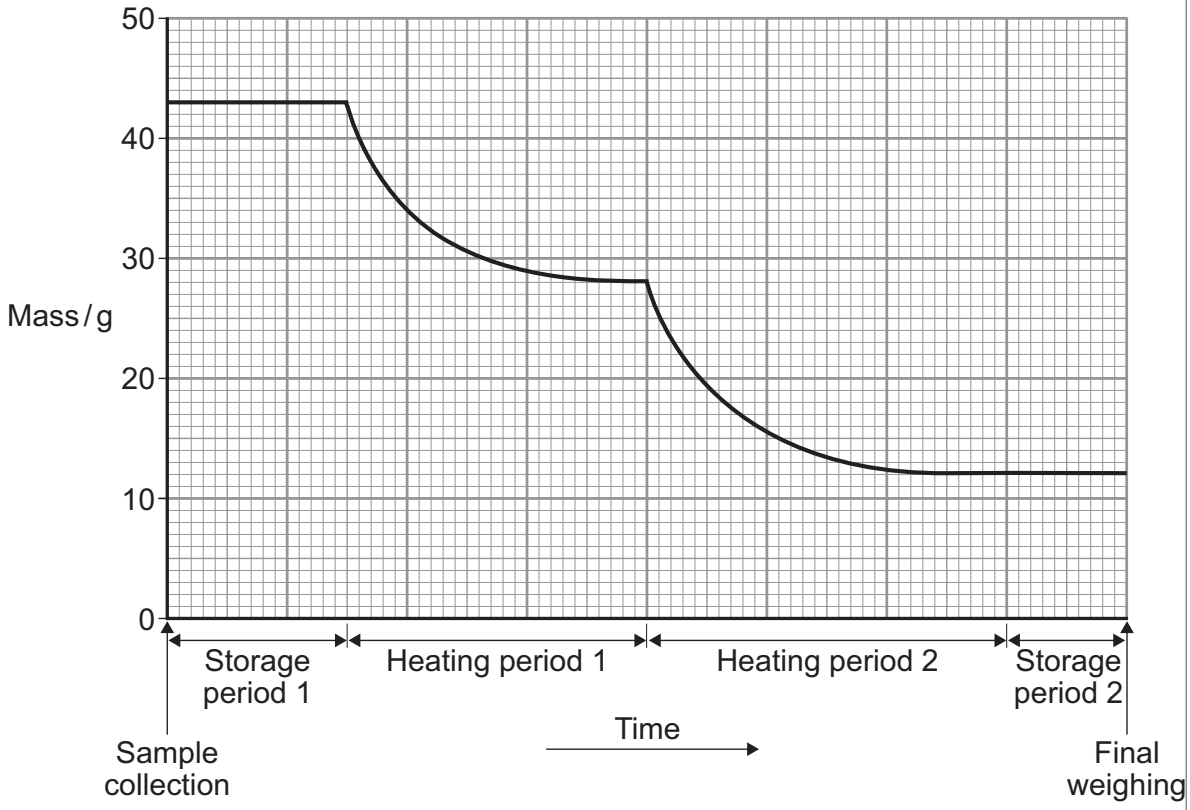
10

Turn over for the next question

7 A student collected soil samples from a field as part of a study to analyse the long-term effect of pesticide spraying on soil organic matter content.

The soil was treated so that the organic matter content could be estimated.

The graph shows the soil mass during the study.



7 (a) What is the purpose of **Heating period 1**?

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(1 mark)

7 (b) Explain why the storage conditions should be different in **Storage periods 1** and **2**.

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(2 marks)

7 (c) Suggest a suitable temperature for **Heating period 2**.

……°C
(1 mark)

7 (d) Calculate the percentage mass of organic matter in the dry soil.

……%
(2 marks)

7 (e) Outline the role of soil organisms in the breakdown of dead organic matter (DOM).

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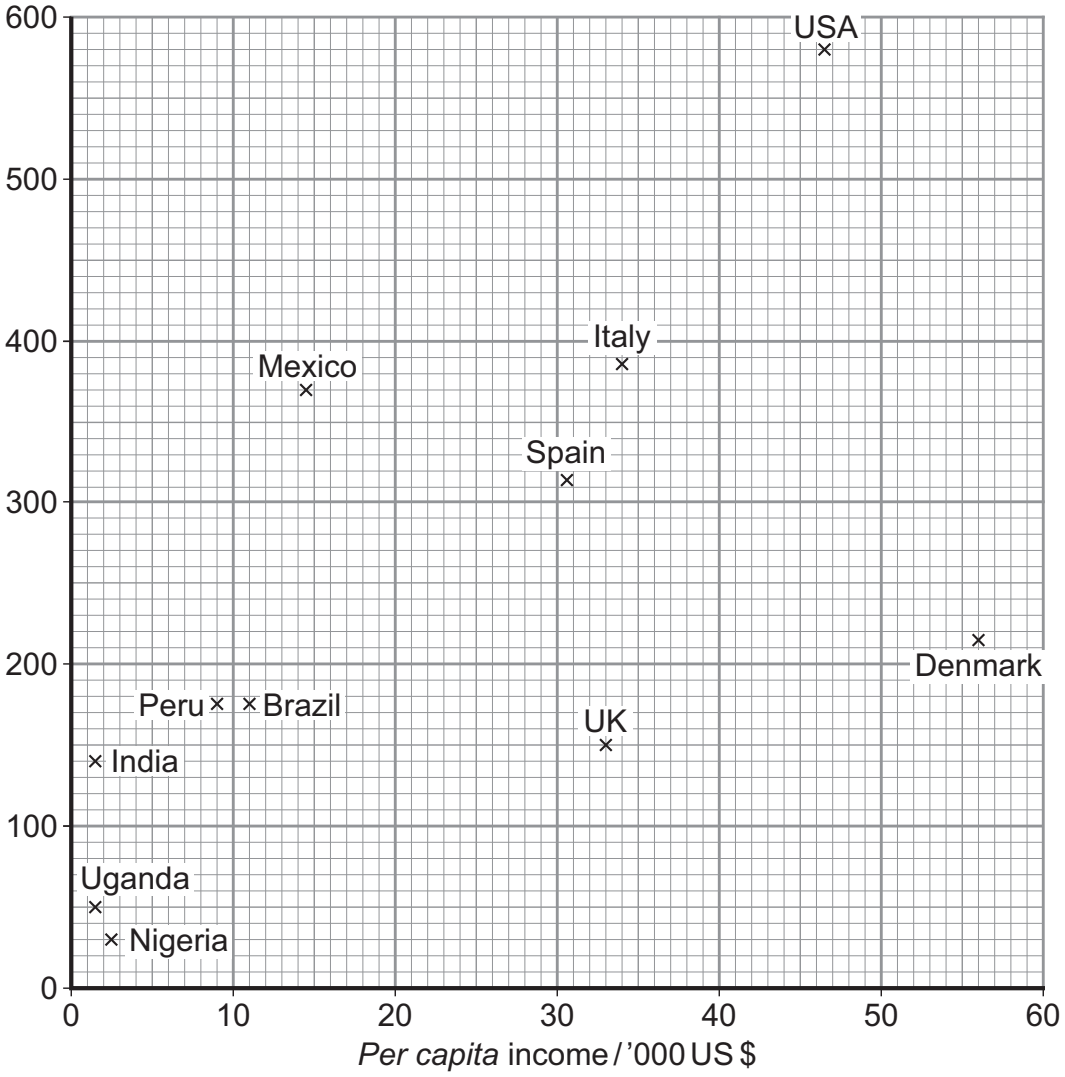
(4 marks)

10

Turn over for the next question

8 The graph shows the *per capita* income and *per capita* water use for a range of countries in 2010.



8 (a) Describe the distribution of the data in the graph.

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(2 marks)

8 (b) Explain the distribution of the data in the graph.

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(4 marks)

8 (c) Describe how the domestic use of water from public supplies may be reduced.

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(4 marks)

10

Turn over for the next question

9 (a) What is the difference between ozone depletion and global climate change in the following?

9 (a) (i) Type of radiation involved

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(1 mark)

9 (a) (ii) Layer of the atmosphere in which radiation is absorbed

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(1 mark)

9 (a) (iii) Direction of travel of the radiation that was absorbed

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(1 mark)

9 (a) (iv) Involvement of CFCs

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(1 mark)

9 (a) (v) International agreements that aim to reduce the problems

.....

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(1 mark)

9 (b) Describe the ways in which positive and negative feedback mechanisms may alter the processes of global climate change.

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

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(10 marks)

Extra space for Question 9(b).....

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15

END OF QUESTIONS

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