



Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

AS

ENVIRONMENTAL STUDIES

Unit 2 The Physical Environment

Wednesday 25 May 2016 Afternoon Time allowed: 1 hour 30 minutes

Materials

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

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.



J U N 1 6 E N V S 2 0 1

HB/211197/Jun16/E4

ENVS2

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

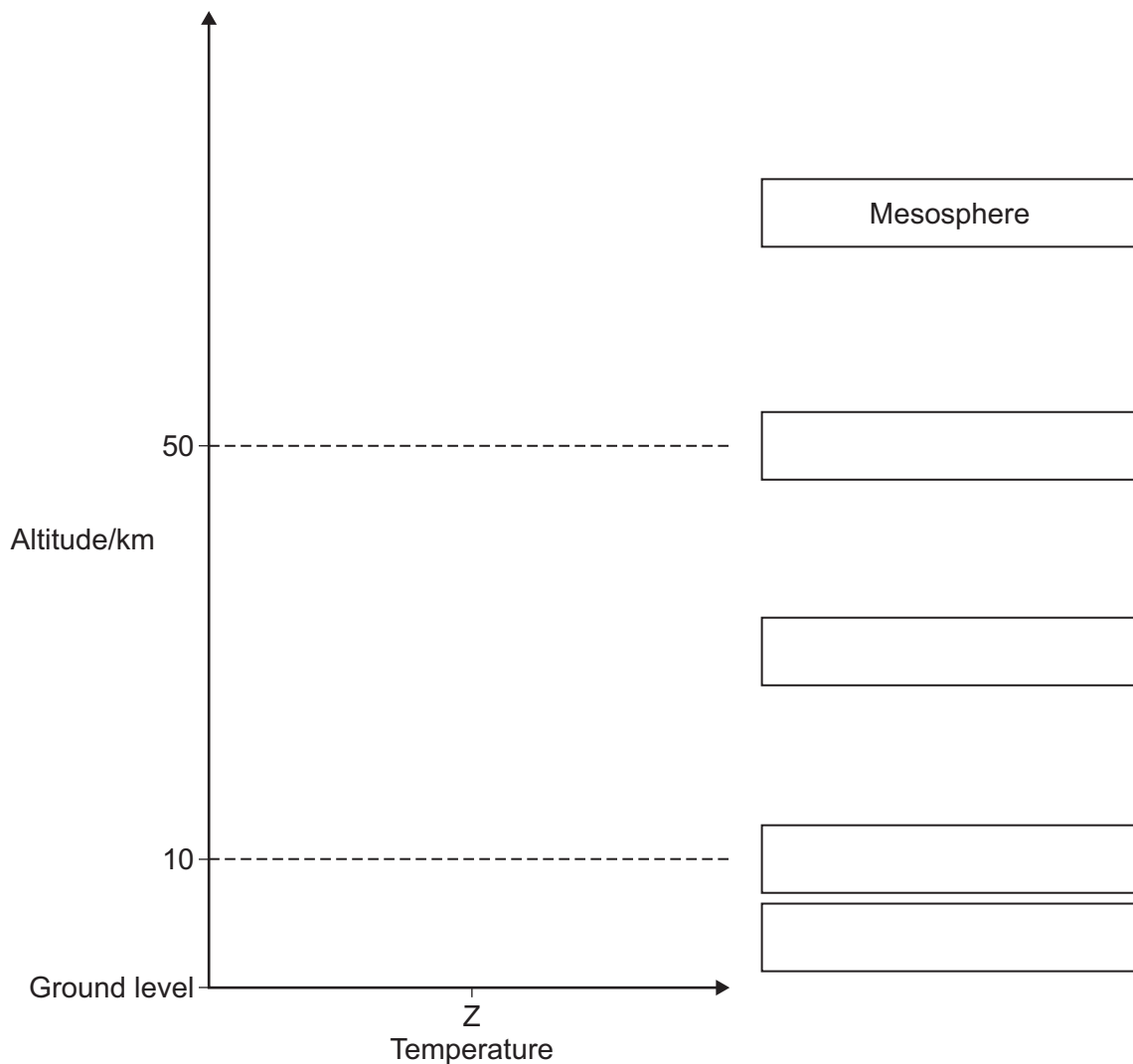
1 (a) **Figure 1** shows the structure of the atmosphere.

1 (a) (i) Complete **Figure 1** by adding the correct labels from the list below.

[2 marks]

Troposphere
Lithosphere
Stratosphere
Mesopause
Tropopause
Stratopause

Figure 1



1 (a) (ii) Draw a line on **Figure 1** to show how temperature changes with increasing altitude up to 50 km.

Start your line at point Z on the x axis.

[1 mark]

1 (b) Outline **two** ways in which the atmosphere is heated by electromagnetic radiation.

[2 marks]

5

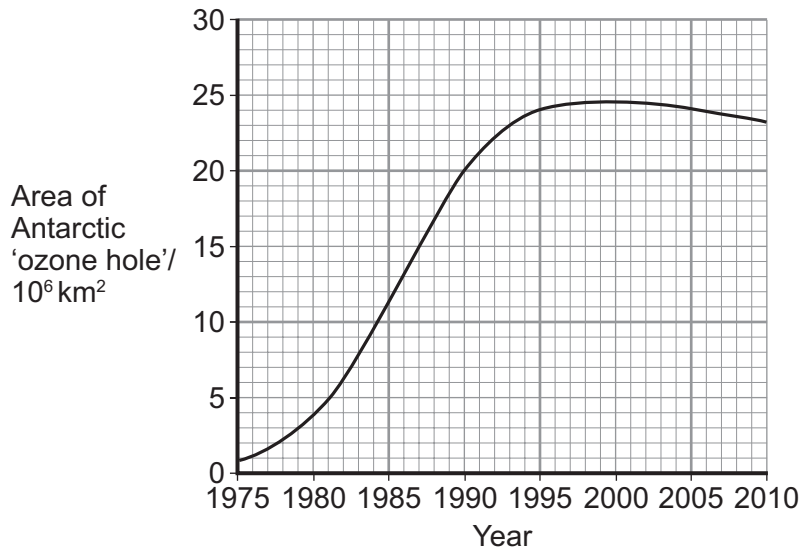
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- 2 **Figure 2** shows changes in the area of the Antarctic 'ozone hole' where stratospheric ozone concentrations drop below 220 Dobson Units.

Figure 2



- 2 (a) Describe how the release of Chlorofluorocarbons (CFCs) has resulted in ozone depletion.

[2 marks]

- 2 (b) Why is ozone depletion a threat to human health?

[2 marks]



2 (c) Outline how CFC use has been reduced by the introduction of:

2 (c) (i) alternative materials

[2 marks]

2 (c) (ii) alternative processes.

[2 marks]

2 (d) Suggest why the Montreal Protocol has been more effective at controlling CFC emissions than the Kyoto Protocol has been at controlling greenhouse gas emissions.

[2 marks]

10

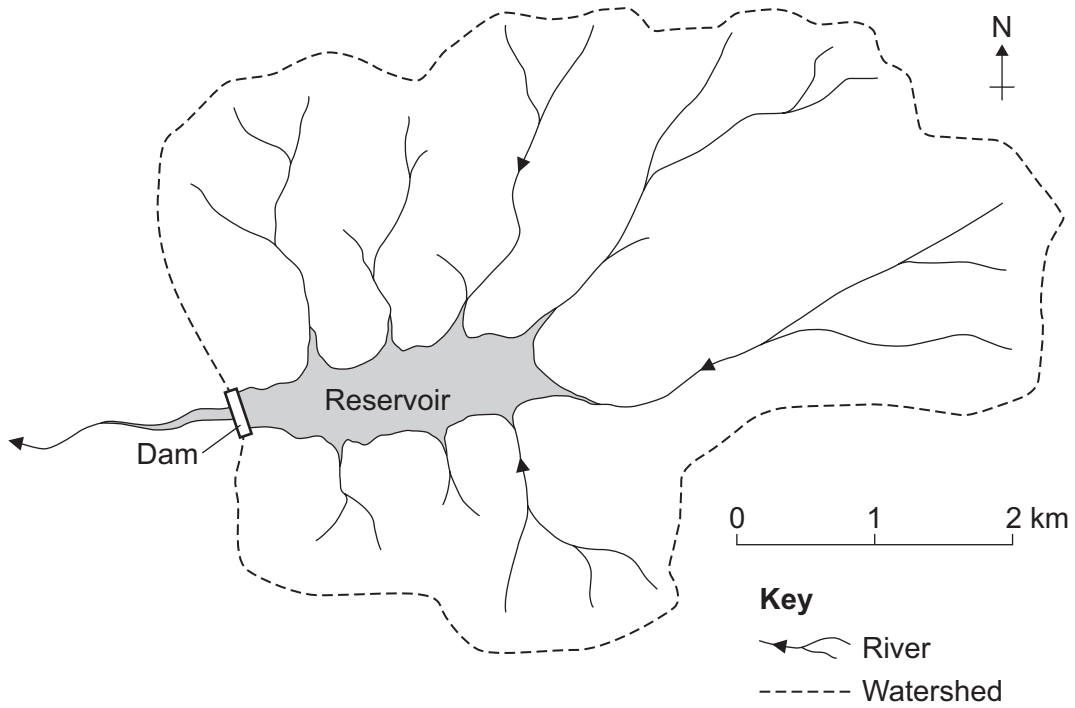
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3 Figure 3 shows a reservoir and its catchment area.

Figure 3



3 (a) Explain how the following land uses may affect the reservoir.

[4 marks]

Forest plantations _____

Urban areas _____



3 (b) Suggest how the presence of the dam may affect wildlife upstream of the reservoir. **[1 mark]**

3 (c) Abstracting water for public supply from aquifers involves few surface land-use conflicts.

3 (c) (i) Name **two** rocks that often form aquifers. **[1 mark]**

1 _____

2 _____

3 (c) (ii) Explain how the porosity and permeability of a rock affect its suitability as an aquifer. **[4 marks]**

Porosity _____

Permeability _____

10

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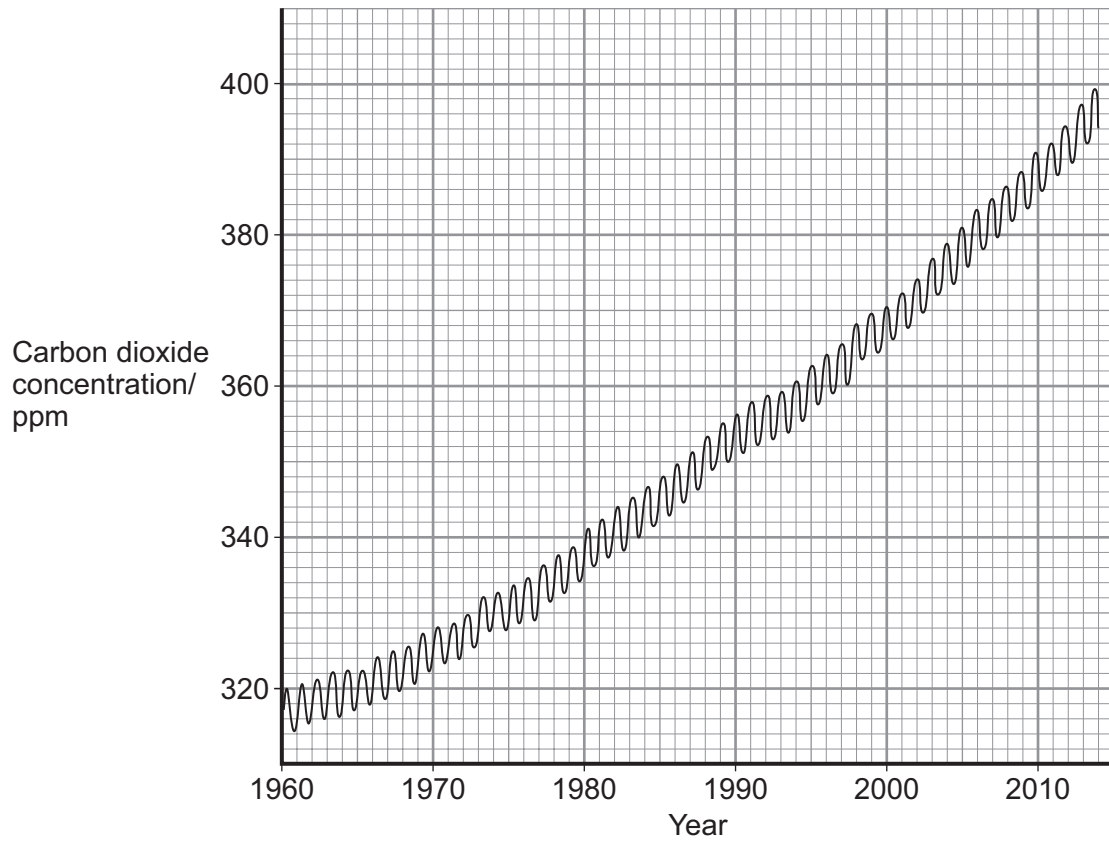
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- 4 Monitoring concentrations of the greenhouse gas carbon dioxide is an important part of predicting global climate change.

Figure 4 shows how atmospheric carbon dioxide concentrations changed between 1960 and 2014 at Mauna Loa, Hawaii.

Figure 4



- 4 (a) Suggest how the timing of sample collection should have been planned to make sure the trends shown in **Figure 4** were observed.

[2 marks]



4 (b) Outline how human activities increase the atmospheric concentrations of **two other** named greenhouse gases.

[4 marks]

Gas 1 _____

Gas 2 _____

4 (c) Plans to reduce anthropogenic climate change need accurate predictions of how the climate is likely to change in the future.

Explain why it is difficult to make accurate predictions of future changes in climate.

[4 marks]

10

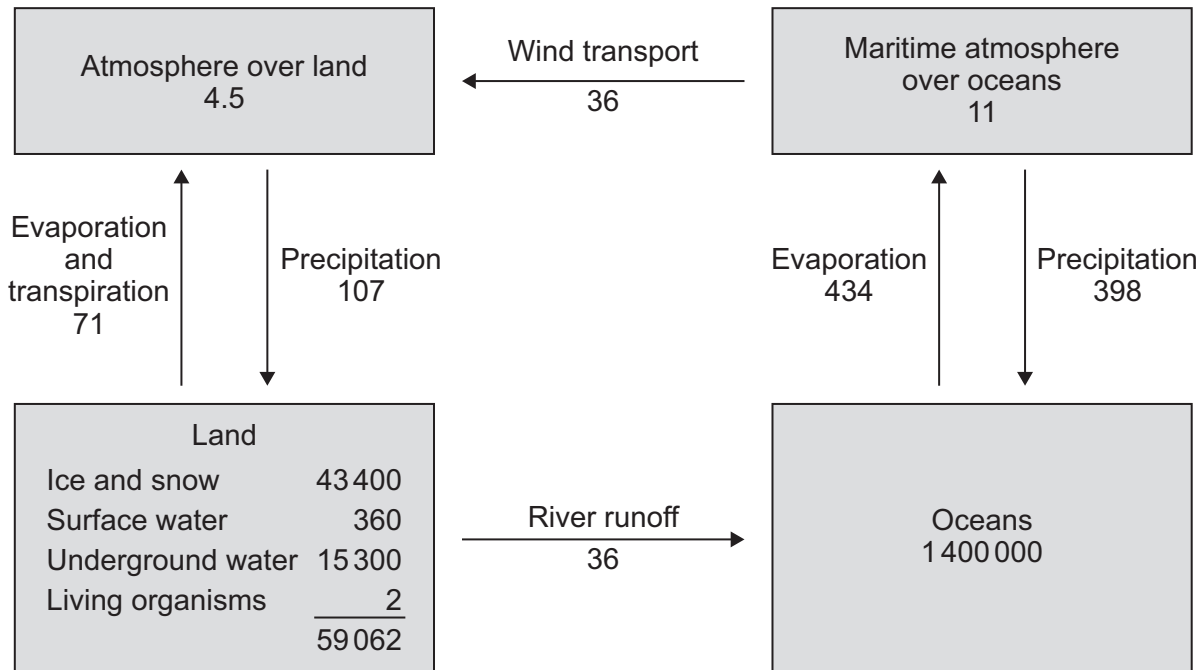
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5 **Figure 5** shows the hydrological cycle.

Figure 5



Key

- Reservoirs in 10^{15} dm^3
- Mean transfer rate in $10^{15} \text{ dm}^3 \text{ yr}^{-1}$

5 (a) Use the formula to calculate the mean residence time for water in the oceans.

$$\text{Residence time} = \frac{\text{volume}}{\text{mean transfer rate}}$$

[1 mark]

Residence time = _____ years

5 (b) Use data from **Figure 5** to explain the meaning of **dynamic equilibrium**.

[2 marks]



5 (c) Describe **two** positive feedback mechanisms that affect global climate, which involve a change in the state of water.

[4 marks]

1 _____

2 _____

5 (d) (i) Describe the changes in density as water cools from 10 °C to its freezing point.

[2 marks]

5 (d) (ii) Explain the significance of these changes for the survival of aquatic life.

[1 mark]

10

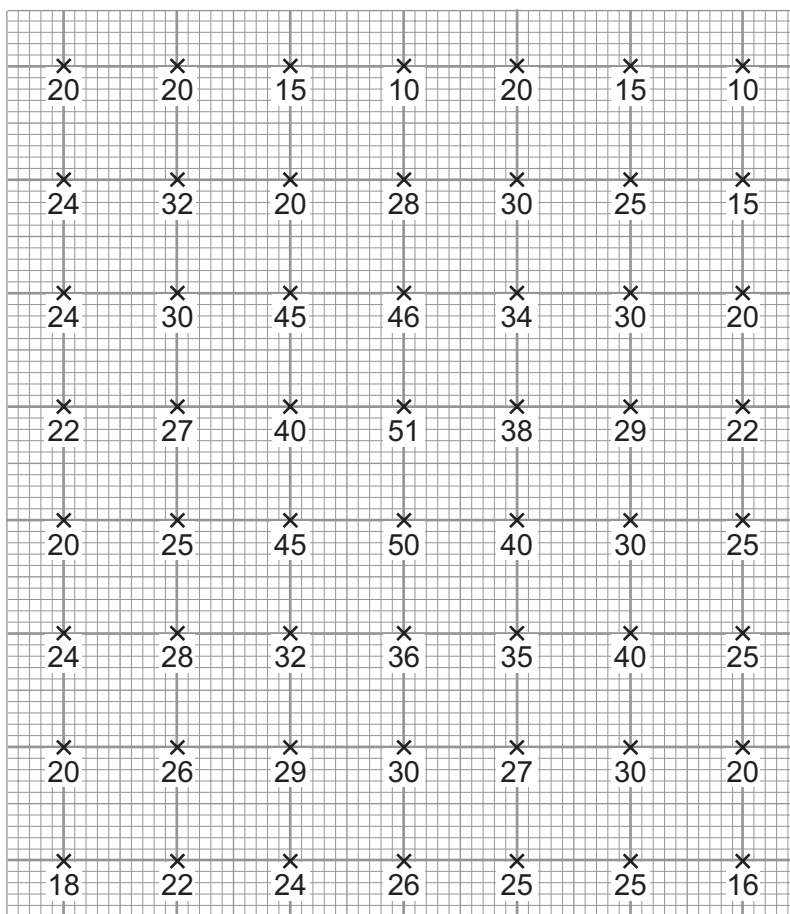
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6 **Figure 6** is a map of a proposed metal ore mine showing the concentrations of metal in samples produced by trial drilling.

Figure 6



Key

× Sample location

← 100 m →

Figures show metal concentration/
g metal kg⁻¹ rock

6 (a) (i) Draw a line on **Figure 6** to show the area that could be mined economically if the Cut Off Ore Grade (COOG) is 28 g kg⁻¹.

[1 mark]

6 (a) (ii) How would the area that may be mined economically change if the COOG decreases?

[1 mark]



6 (b) Describe **one** named remote sensing method that may be used to find areas where trial drilling may be carried out.

[3 marks]

6 (c) Explain why the exploitation of low-grade ores may increase the environmental damage caused by mineral exploitation.

[3 marks]

6 (d) How does the resource of a mineral differ from its reserves?

[2 marks]

10

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7 **Figure 7** shows a soil triangle used to identify soil type.

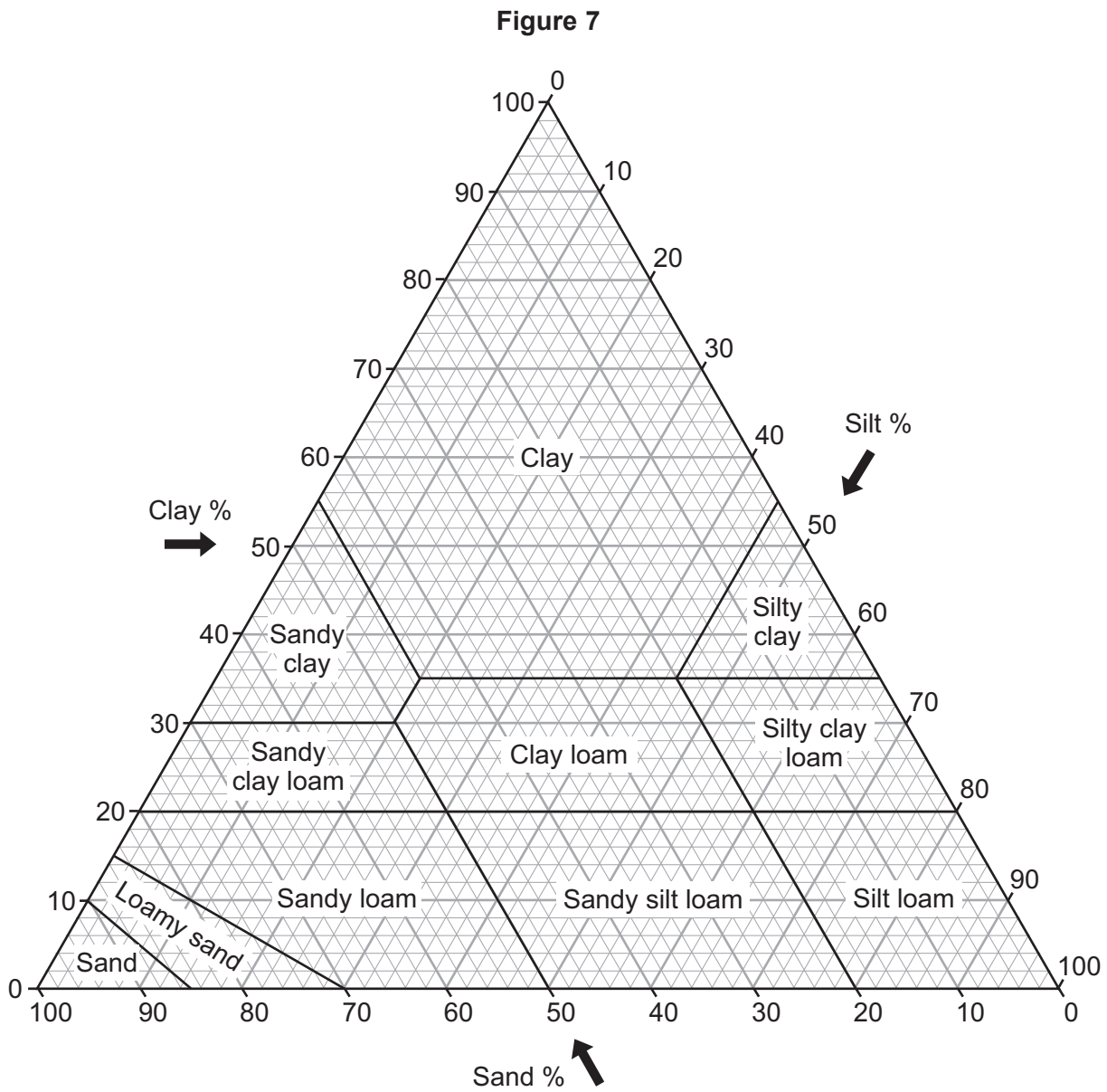


Table 1 shows the mineral composition of a soil sample (A).

Table 1

Soil sample A		
Clay content / %	Silt content / %	Sand content / %
25	40	35



7 (a) (i) Use the soil triangle to identify the soil type of sample **A**.

[1 mark]

Tick (✓) **one** box.

Silt loam

Clay loam

Sandy clay

Silty clay

Sandy silt loam

7 (a) (ii) What is the highest sand content that can be found in a silty clay loam soil?

[1 mark]

_____ %

7 (b) Describe **one** method that may be used to analyse soil texture quantitatively.

[3 marks]

Question 7 continues on the next page

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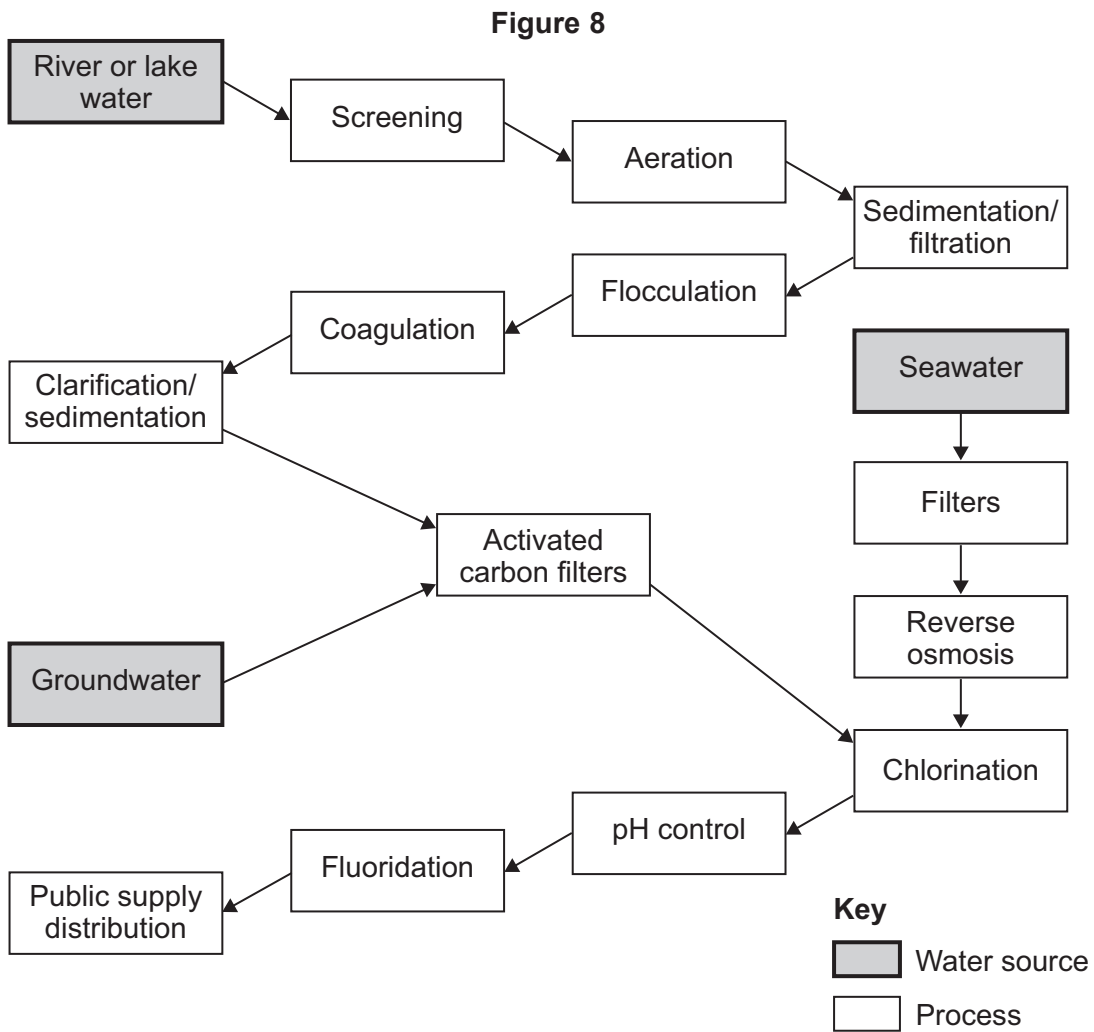
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8 Figure 8 shows treatment processes of water for public supply.



8 (a) Outline how the following water treatment processes improve water quality.

8 (a) (i) Aeration

[1 mark]

8 (a) (ii) Activated carbon filters

[1 mark]



8 (b) Name **one** method of water sterilisation **not** shown in **Figure 8**.

[1 mark]

8 (c) Describe how suspended clay particles are removed from the water.

[3 marks]

8 (d) Describe how the pH of the water may be measured.

[2 marks]

8 (e) Outline the process of reverse osmosis.

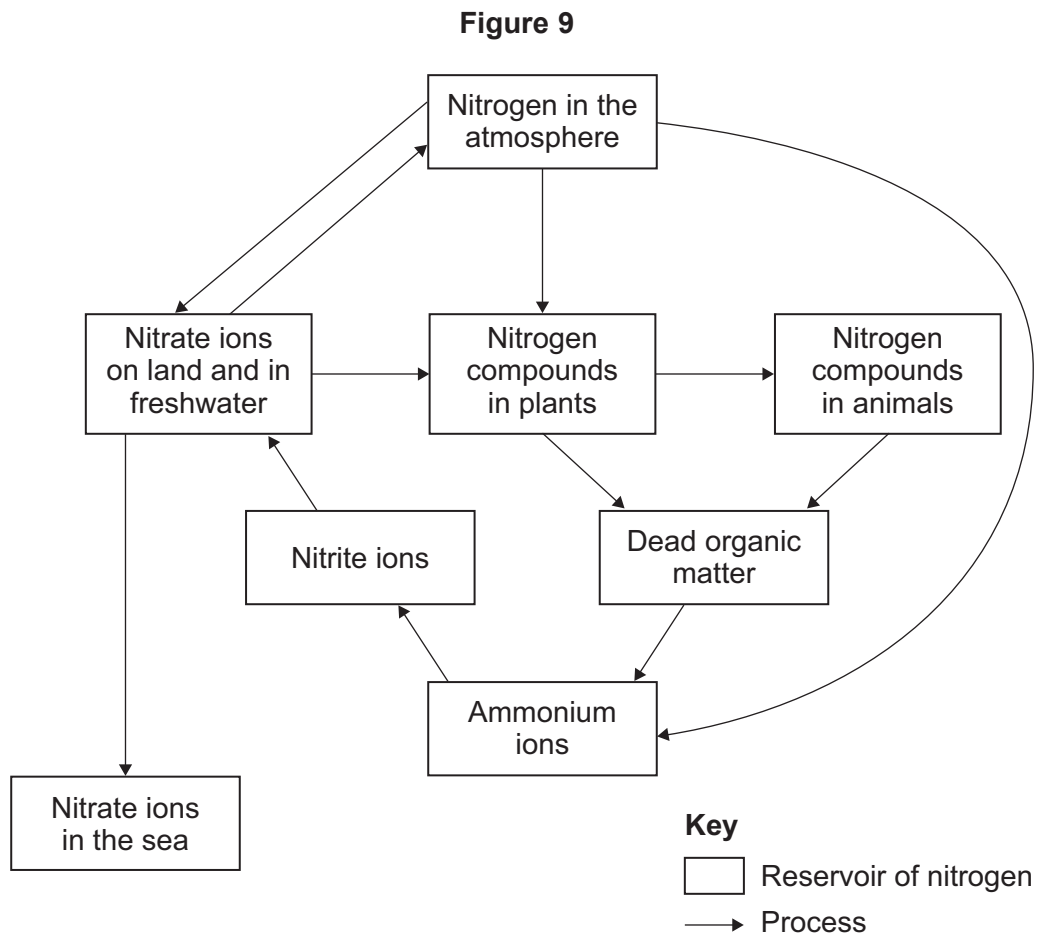
[2 marks]

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9 **Figure 9** shows reservoirs and processes of the nitrogen cycle.



9 (a) Outline **two** ways in which bacteria are involved in named processes in the nitrogen cycle.

[2 marks]



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