Cambridge Assessment International Education

Cambridge International AS Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

ENVIRONMENTAL MANAGEMENT **8291/21**

Paper 2 Management in Context **May/June 2025**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION
- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **24** pages. Any blank pages are indicated.

[Turn over

1 A report stated that people who live near waste incineration plants are less likely to recycle their waste.

(a) A student uses a questionnaire to investigate this statement.

Suggest **three** reasons why the student carries out a pilot survey before the questionnaire.

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2 ....

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3 ....

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[3]

(b) The student considers two different question styles for the questionnaire.

style 1:	tick (✓) yes or cross (✗) no
Do you agree that living near to a waste incineration plant means you are less likely to recycle your waste?	

style 2:	1 = strongly agree 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree
To what extent do you agree that living near to a waste incineration plant means you are less likely to recycle your waste?	

Describe the benefits of the two different question styles.

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.... [3]

(c) The student then decides to carry out recorded interviews with some of the people in the survey.

(i) Suggest the benefits of using recorded interviews.

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.... [2]

(ii) The student selects only women aged 40–50 years for the recorded interviews.

State a limitation of this sampling method.

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.... [1]

(d) The student concludes that a lack of recycling facilities is the main reason people do not recycle their waste.

(i) Suggest **two** reasons for a lack of recycling facilities.

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[2]

(ii) Explain how financial incentives and legislation encourage more people to recycle their waste.

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.... [2]

(e) Explain the impacts of landfill as a method of waste disposal.

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.... [5]

[Total: 18]

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2 Water turbidity measures the cloudiness of water.

Turbidity is caused by undissolved solids in water.

(a) A student uses a Secchi disc to measure the turbidity of water in four lakes, **A**, **B**, **C** and **D**.

A Secchi disc is a white and black disc. The disc is suspended by a central cord. The cord has markings at 10 cm intervals.

Fig. 2.1 shows a Secchi disc in water.

water surface

cord

not to scale
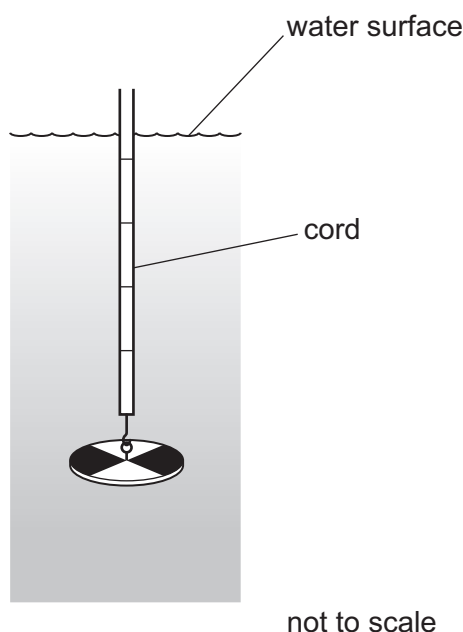
Fig. 2.1

The student:

- lowers the Secchi disc into the water until the disc is completely invisible (cannot be seen). This depth is recorded as **maximum depth**.
- raises the Secchi disc until the pattern on the disc is just visible. This depth is recorded as **minimum depth**.
- calculates the mean of the maximum and minimum depths and records this as the **Secchi depth**.

Table 2.1 shows the results.

Table 2.1

lake	maximum depth /m	minimum depth /m	Secchi depth /m
A	3.40	0.20	1.80
B	2.90	0.50	
C	5.75	0.30	3.03
D	4.85	0.45	2.65

(i) Calculate the Secchi depth for lake **B**.

Secchi depth for lake **B** = ... m [1]

(ii) Suggest **two** reasons why it is **not** suitable to use a Secchi disc in some weather conditions.

1 ....

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2 ....

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[2]

(iii) The student repeats the investigation twice a week for three months.

Explain why recording more than one set of maximum and minimum depths per lake is good sampling practice.

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.... [2]

(b) Surface water contains phytoplankton.

Phytoplankton are producers.

(i) State the source of energy for phytoplankton.

.... [1]

(ii) Explain why chlorophyll concentration is an indicator of primary production in surface water.

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.... [2]
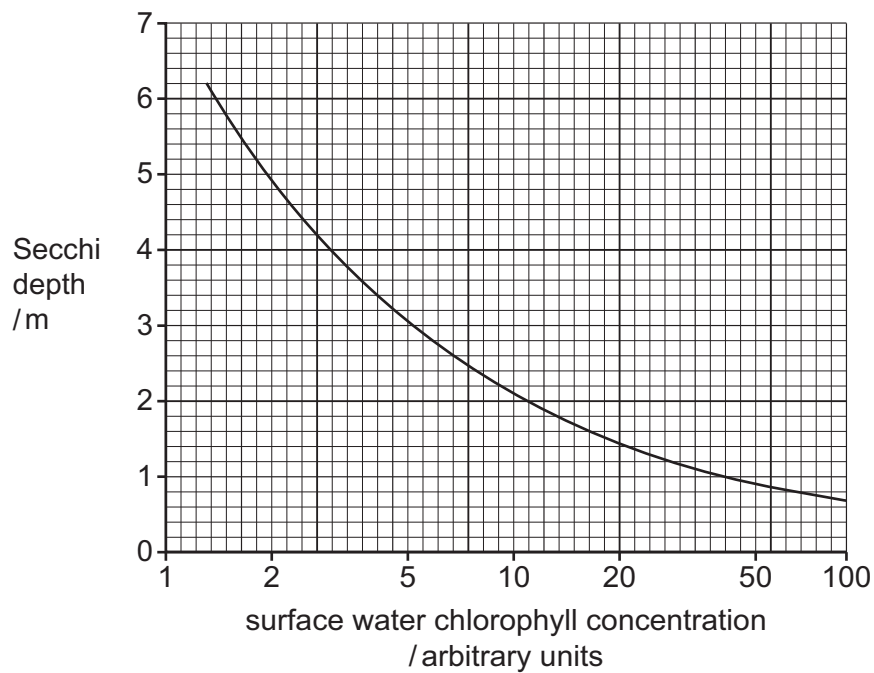
(c) The student investigates how Secchi depth relates to the concentration of surface water chlorophyll.

Fig. 2.2 shows the results.

Fig. 2.2

Write a suitable conclusion from the data in Fig. 2.2.

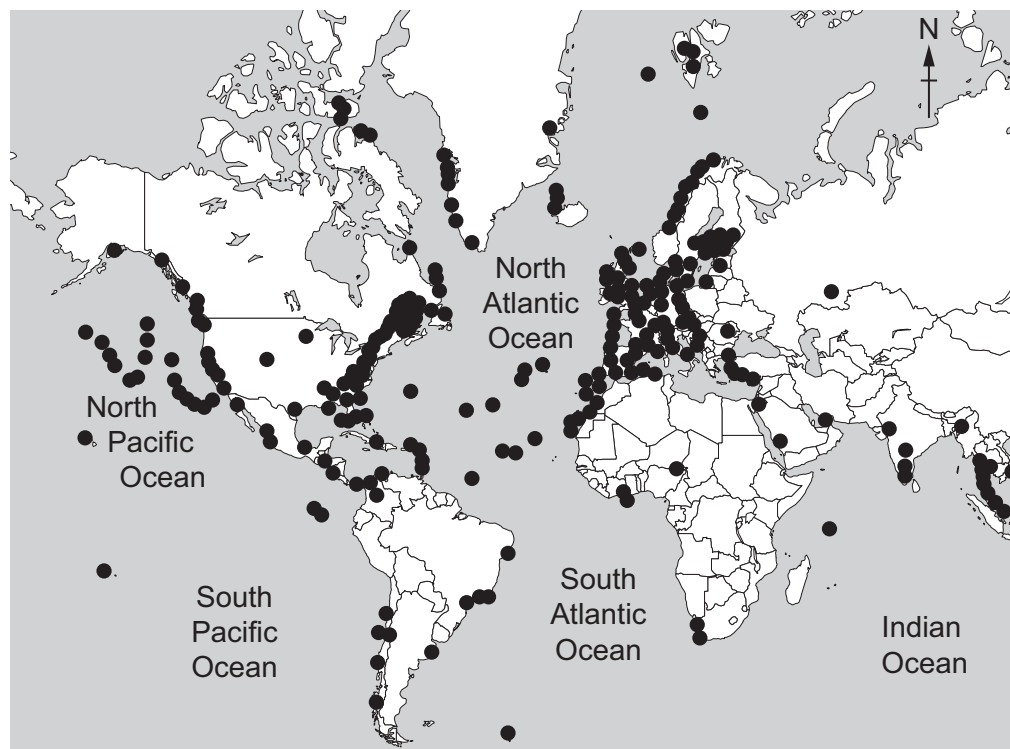...

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.... [1]

(d) The 'Secchi Disk Study' is a crowd sourced investigation into global phytoplankton populations.

In the study, people submit Secchi depths from oceans around the world and upload the data to a website.

Fig. 2.3 shows the location of the crowd sourced sampling sites up to May 2022.

Key
- sampling site

Fig. 2.3

(i) Outline the benefits and limitations of obtaining scientific data by crowd sourcing.

benefits ....

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limitations ....

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[4]

(ii) Suggest how climate change could decrease phytoplankton populations.

Give reasons for your answer.

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.... [3]

(e) An electronic hand-held meter is used to measure turbidity at 70 locations along the length of a river.

Fig. 2.4 shows the results.
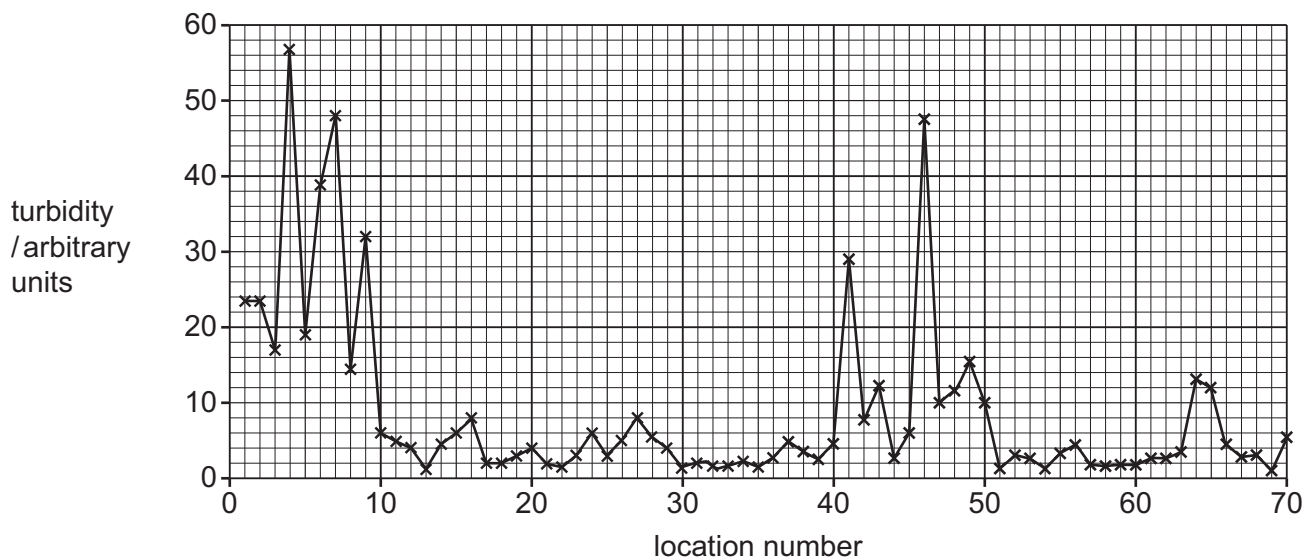
Fig. 2.4

(i) State which location has the greatest turbidity.

location number = ... [1]

(ii) State the turbidity at location 41.

turbidity = ... arbitrary units [1]

(f) Fig. 2.5 shows the relationship between fish activity and turbidity.
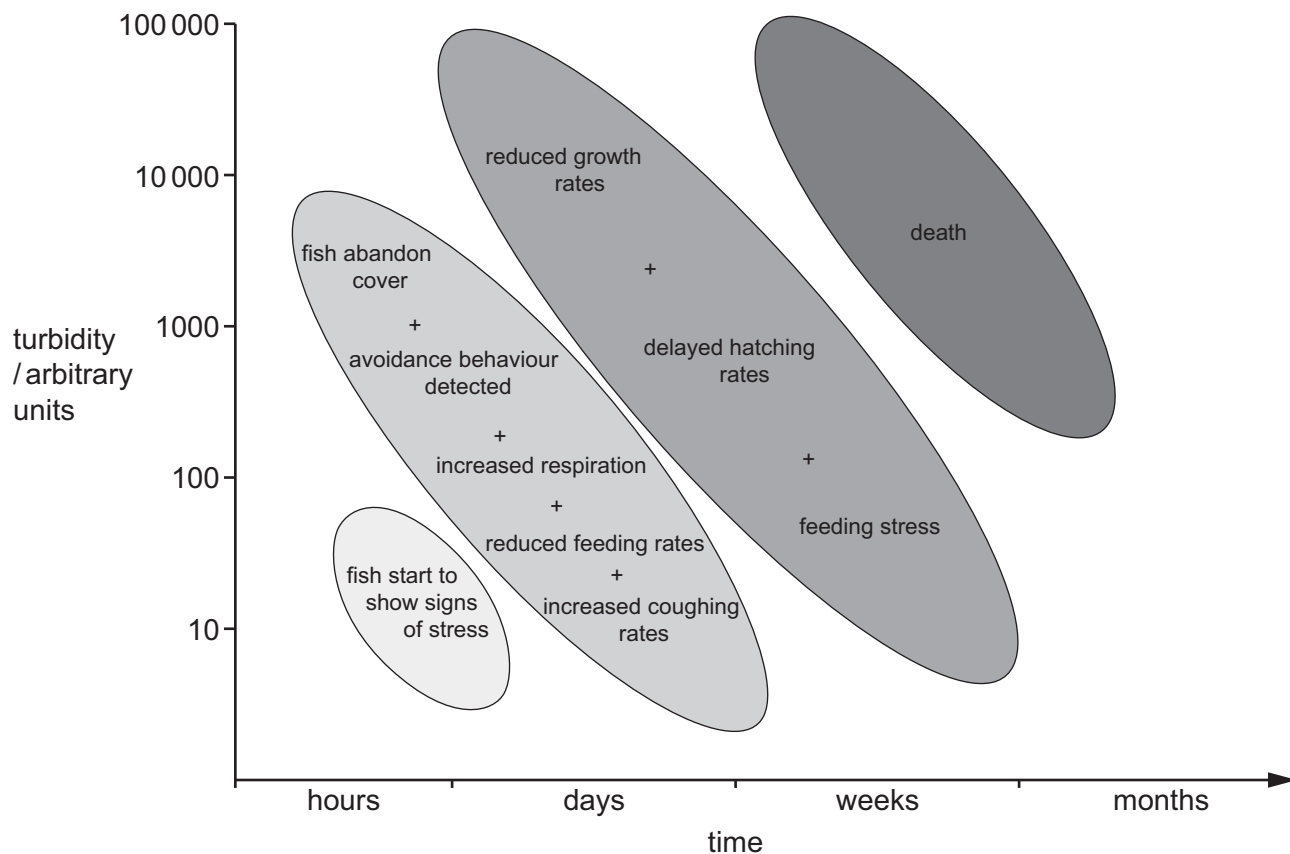
Fig. 2.5

The turbidity at location 7 remains at 48 arbitrary units for 3 weeks.

Describe the impacts of this turbidity on fish activity.

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.... [2]

[Total: 20]

3 **(a)** Chlorofluorocarbons (CFCs) from aerosols and refrigerants cause ozone depletion.

(i) State the layer of the atmosphere which contains the ozone layer.

.... [1]

(ii) Outline how ozone depletion occurs.

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.... [4]

(b) International agreements phased out the use of CFCs. The use of CFCs is now banned.

A computer model is used to predict the impact of different international agreements on the concentration of ozone-depleting substances (ODS).

Fig. 3.1 shows the predicted impact of each international agreement on the concentration of ozone-depleting substances (ODS).
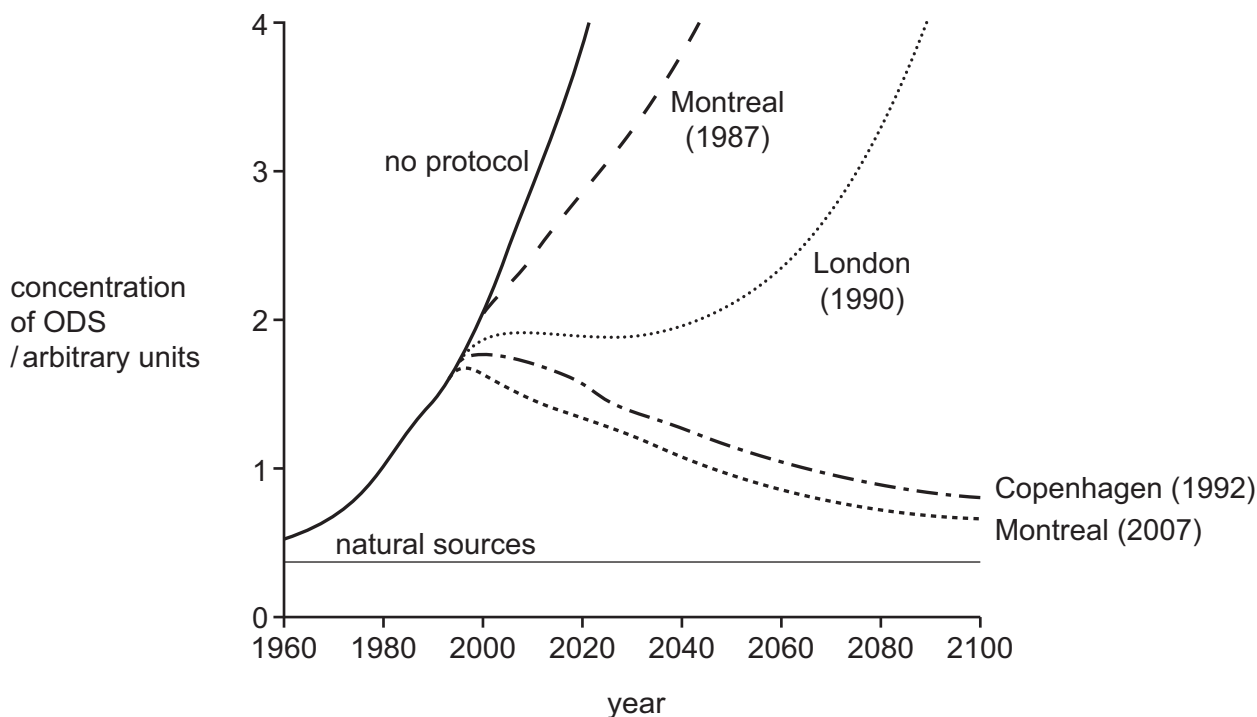
Fig. 3.1

(i) Use Fig. 3.1 to evaluate the effectiveness of the international agreements in controlling ODS.

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.... [3]

(ii) Suggest why natural sources are included in the data.

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.... [1]

(c) Fig. 3.2 shows the percentage change in ultraviolet radiation reaching the Earth's surface in 2008 compared to 1979.
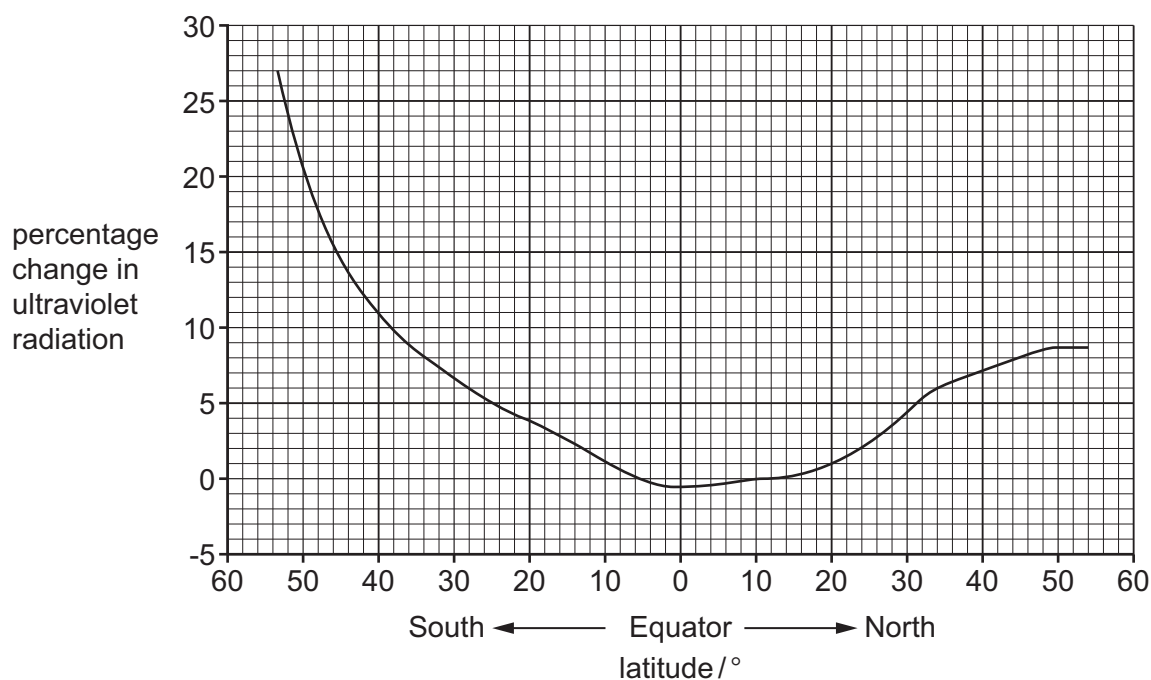
Fig. 3.2

(i) Explain the data shown in Fig. 3.2.

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.... [3]

(ii) State **three** impacts of increased amounts of ultraviolet radiation reaching the Earth's surface.

1 ....

2 ....

3 ....

[3]

(d) A company collects and destroys CFCs from discarded refrigeration units.

Compared to carbon dioxide, CFCs produce more than 10 000 times as much global warming.

The company has destroyed the equivalent of 460 000 000 tonnes of carbon dioxide.

Other companies buy 'carbon offset credits' from this company. Each carbon offset credit is equivalent to 1 tonne of carbon dioxide emissions into the atmosphere.

Carbon offset credits allow other companies to continue to release carbon dioxide into the atmosphere.

Suggest the benefits and limitations of carbon offset credits for reducing the impact of climate change.

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.... [3]

[Total: 18]

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4 (a) Biochar is added to soil to improve soil structure. Biochar also adds nutrients to soil.

Biochar is produced from biomass heated to high temperatures with limited or no oxygen.

Fig. 4.1 shows the process of biochar production.
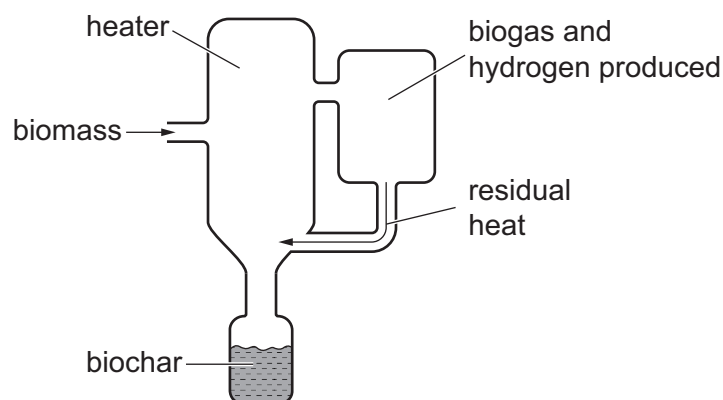
Fig. 4.1

(i) Describe how biochar production could reduce the use of non-renewable resources.

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.... [2]

(ii) Biochar is 80% carbon and can take thousands of years to decompose.

Describe how biochar can reduce the impact of climate change.

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.... [2]

(b) Table 4.1 shows chemical properties of biochar produced from the waste biomass of six crops.

Table 4.1

biochar crop	chemical properties of biochar		
	pH	percentage of nitrogen	percentage of potassium
prosopis	9.7	1.23	0.50
rice	8.1	1.78	0.20
maize	10.0	2.06	0.80
cotton	10.6	0.67	1.40
red gram	10.8	1.65	2.50
sorghum	11.8	1.02	3.90

(i) Plot the percentage of nitrogen for each crop as a bar chart.

[4]
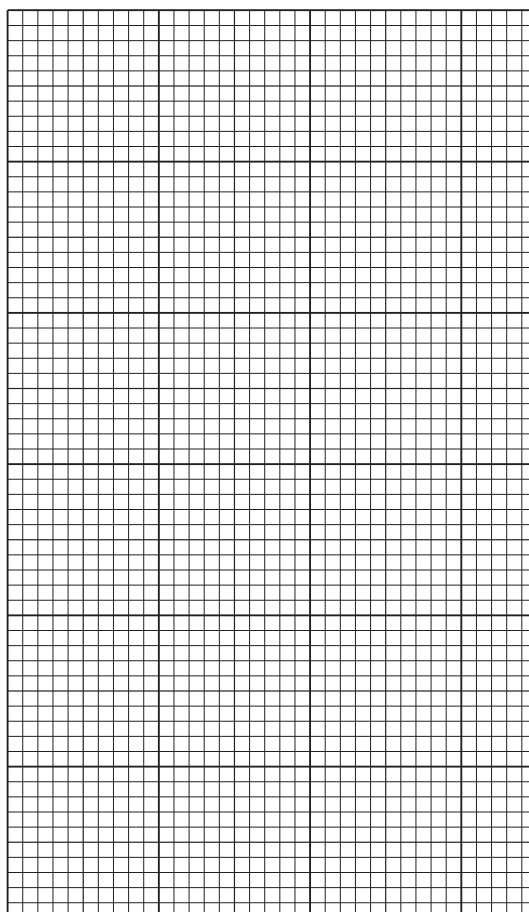
   (ii) State which biochar crop is most suitable to add to a soil deficient in potassium.

.... [1]

   (iii) Calculate the range in pH of biochar shown in Table 4.1.

range in pH = ... [1]

   (iv) Acid soils can be improved by adding biochar.

State which biochar crop reduces soil acidity the most.

.... [1]

   (v) The pH of an ecosystem is an abiotic component.

State **two** other abiotic components.

1 ....

2 ....

[2]

   (vi) Suggest how growing vegetation for biomass can increase food insecurity.

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.... [1]

   (vii) Suggest how the use of biochar benefits rural communities in the Amazon region.

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.... [1]

(c) Fig. 4.2 shows deforested areas in the Amazon rainforest biome.

Key

〜〜 river

-·-·-· Amazon rainforest biome

▨ deforested area
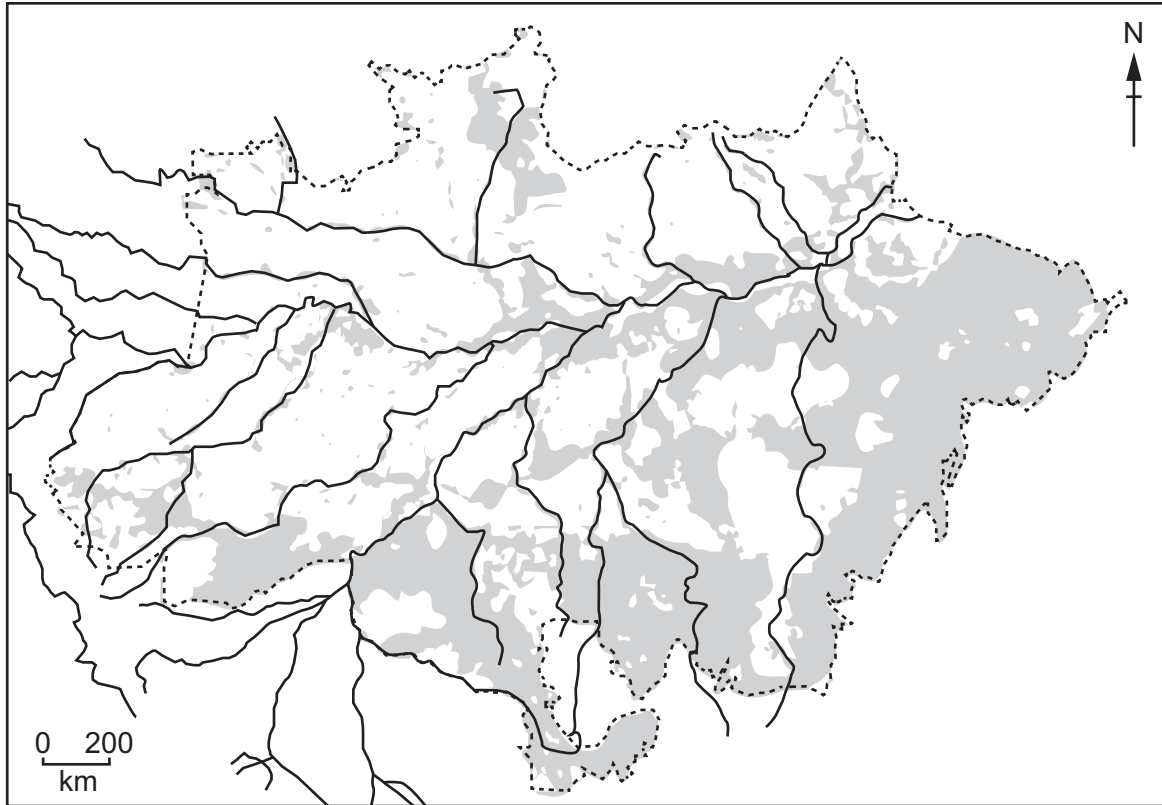
Fig. 4.2

Use Fig. 4.2 to describe the distribution of deforested areas in the Amazon rainforest biome.

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.... [3]

(d) Table 4.2 shows causes of deforestation in the Brazilian Amazon rainforest.

Table 4.2

cause of deforestation	percentage
cattle ranching	65
large-scale agriculture	10
logging	3
other	2
small-scale agriculture	20

(i) Use Table 4.2 to complete the key for the pie chart in Fig. 4.3.

Key
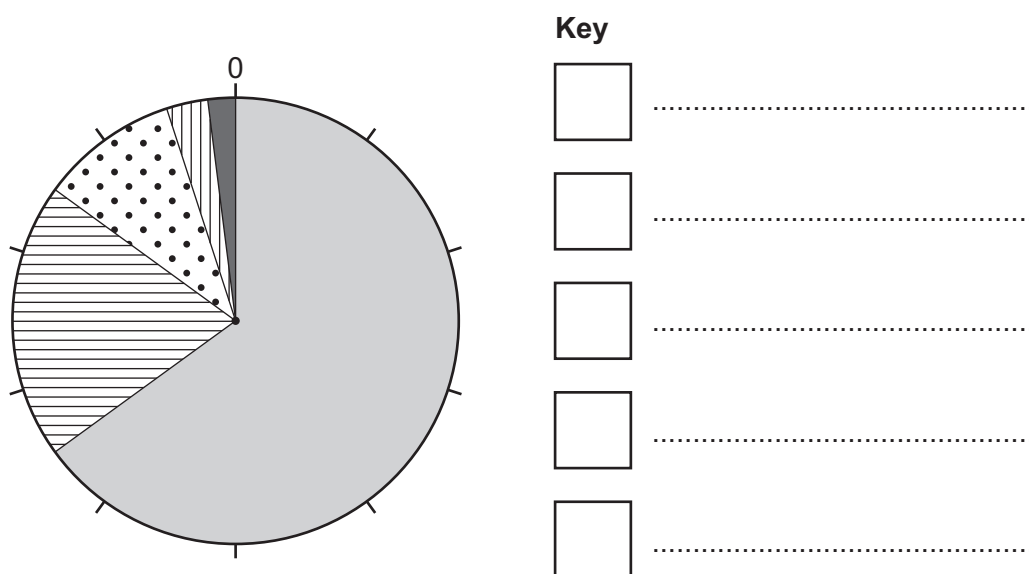
Fig. 4.3

[1]

(ii) Suggest **two** causes of deforestation for the category labelled 'other'.

1 ....

2 ....

[2]

(e) Areas of deforested rainforest experience changes over time called succession.

(i) Outline the characteristics of pioneer species in a rainforest biome.

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.... [2]

(ii) State the name of the final succession stage of a community.

.... [1]

[Total: 24]

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