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ENVIRONMENTAL MANAGEMENT **8291/22**

Paper 2 Management in Context **May/June 2026**

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. Do **not** use correction fluid or tape.
- 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 **28** pages. Any blank pages are indicated.

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1 (a) Figure 1.1 shows elephant seals and tourists on an island off the coast of Antarctica.

Figure 1.1

(i) Suggest **two** negative impacts of tourism on elephant seals.

1 .....

.....

2 .....

.....

[2]

(ii) State **three** ways the Antarctic Treaty manages the impact of human activity on Antarctica, other than tourism control.

1 .....

.....

2 .....

.....

3 .....

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[3]

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(b) Elephant seals feed on squid in the Southern Ocean. Elephant seals dive under the ocean surface to find the squid.

A scientist investigates the relationship between dive depth and maximum temperature of ocean water at depths greater than 100 m.

Figure 1.2 shows the results.

key

• dive depth

----- maximum ocean temperature

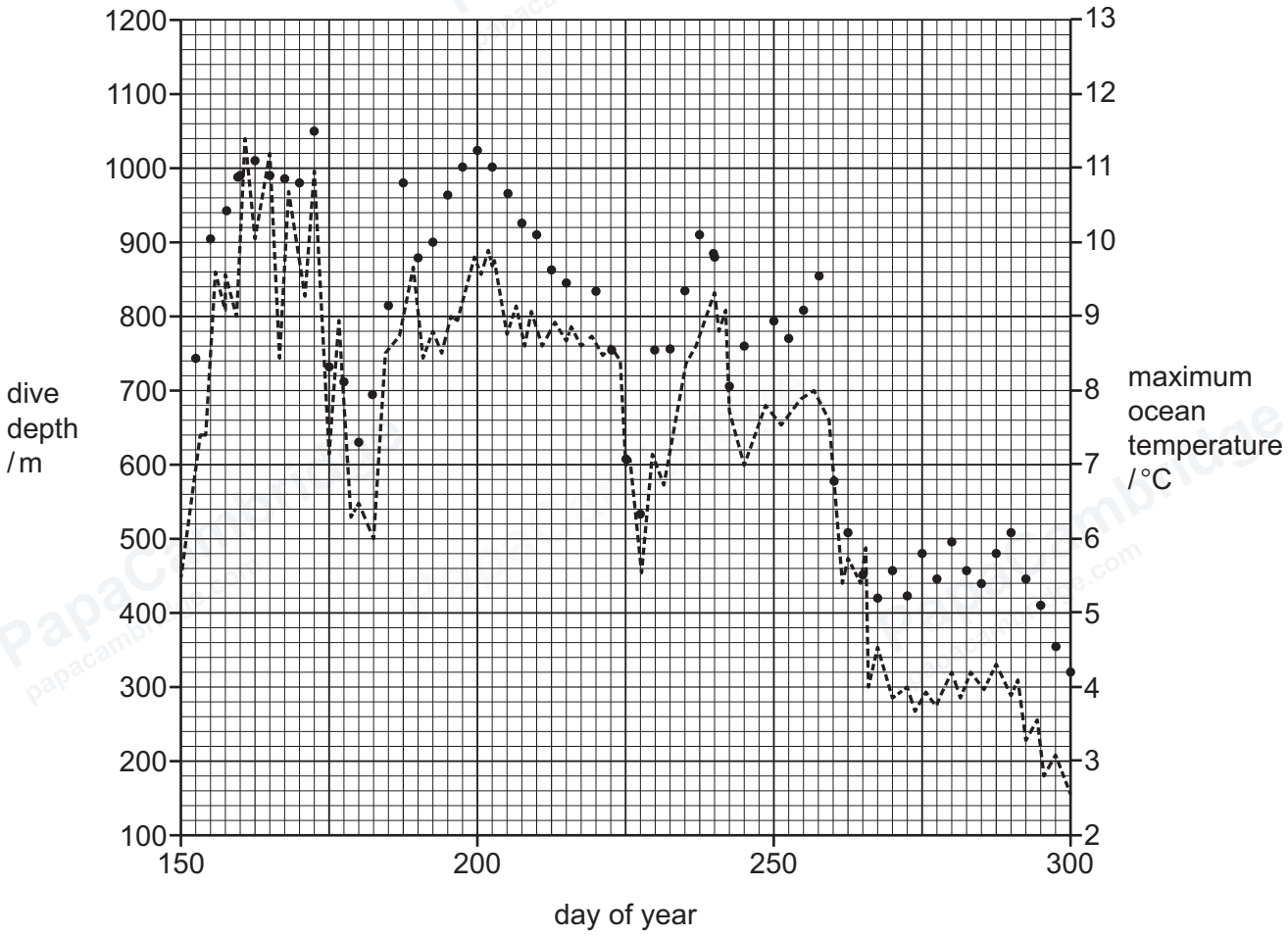

Figure 1.2

(i) State the day of the year with the coldest ocean temperature.

day of year = ... [1]

(ii) State the maximum dive depth recorded.

maximum dive depth = ... m [1]

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(iii) Complete the conclusion about the data in Figure 1.2.

Choose from these terms. Each term can be used once, more than once or not at all.

decreases **increases** **stays the same**

The depth that elephant seals dive to ..... when the

ocean water temperature ..... .

[1]

(iv) Describe how a radio tracking device is used to obtain the data in Figure 1.2.

.....

.....

.....

.....

..... [2]

(c) Elephant seals spend 8 to 10 months of the year in the open ocean.

Scientists predict that global warming will increase the temperature of the oceans.

Suggest **two** impacts to elephant seals if the temperature of the oceans increases.

Give a reason for each impact.

impact 1 .....

reason .....

.....

.....

impact 2 .....

reason .....

.....

.....

[4]

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(d) The population of elephant seals on an island near Antarctica is investigated using two methods.

method 1: ground count

- Go to 10 beaches on the island.
- Count the number of elephant seals on each beach on one day.

method 2: aerial count

- Use a plane to fly over the same 10 beaches on the island.
- Take photographic images of each beach.
- Count the number of elephant seals in the images on each beach on one day.

Discuss the advantages of method 2 compared with method 1.

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..... [4]

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(e) The data from the two methods for the 10 beaches is shown in Figure 1.3.

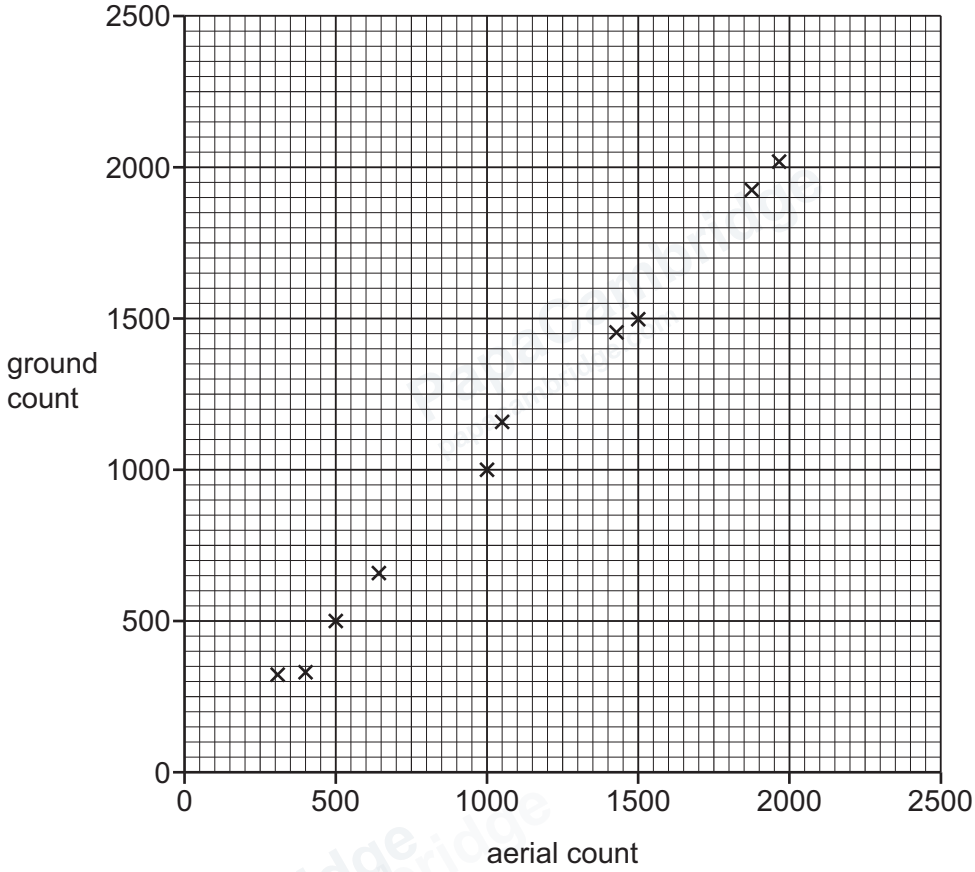

Figure 1.3

(i) Draw a line of best fit for the plotted points on Figure 1.3. [1]

(ii) Suggest how the data in Figure 1.3 shows the two methods give similar results.

.....

..... [1]

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(f) Figure 1.4 shows the location of the elephant seals and the number of females of reproductive age.

key

number of females of reproductive age

- 10−399
- 400−599
- 600−999
- 1000−1999
- 2000−2999
- 3000−3999
- 4000−4600

Figure 1.4

Predict the location which has the optimum conditions for elephant seals.

Circle your chosen location.

east coast **interior** **north coast**

south coast **west coast**

[1]

[Total: 21]

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2 **(a)** The bar chart in Figure 2.1 shows the percentage change in population for some countries in 2023.

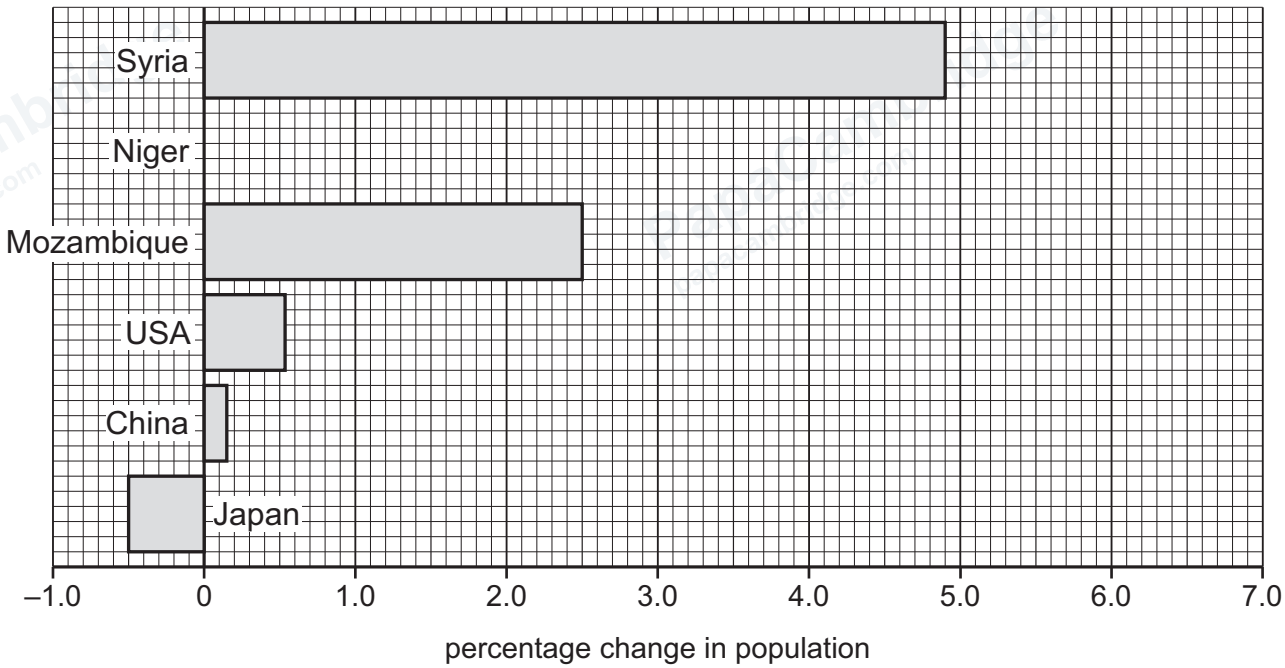

Figure 2.1

(i) Complete the bar for Niger to show population change of +3.7%. [2]

(ii) Describe what the data for Japan shows.

.....

.....

.....

..... [2]

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(iii) Table 2.1 shows the World Bank income group for the six countries in 2023.

Table 2.1

country	income group
Syria	low income economy (LIC)
Niger	low income economy (LIC)
Mozambique	low income economy (LIC)
USA	high income economy (HIC)
China	upper middle income economy (MIC)
Japan	high income economy (HIC)

Compare the percentage change in population in Figure 2.1 with income group shown in Table 2.1.

.....

.....

.....

.....

..... [2]

(b) An increase in global population is predicted to increase the global number of cars.

Figure 2.2 shows the global number of cars in 2025 and the predicted number for 2040.

Figure 2.2

Calculate the predicted percentage increase in the global number of cars from 2025 to 2040.

percentage increase = ...% [2]

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(c) Governments introduce transport policies to help manage climate change.

Figure 2.3 shows a flying car called AirCar.

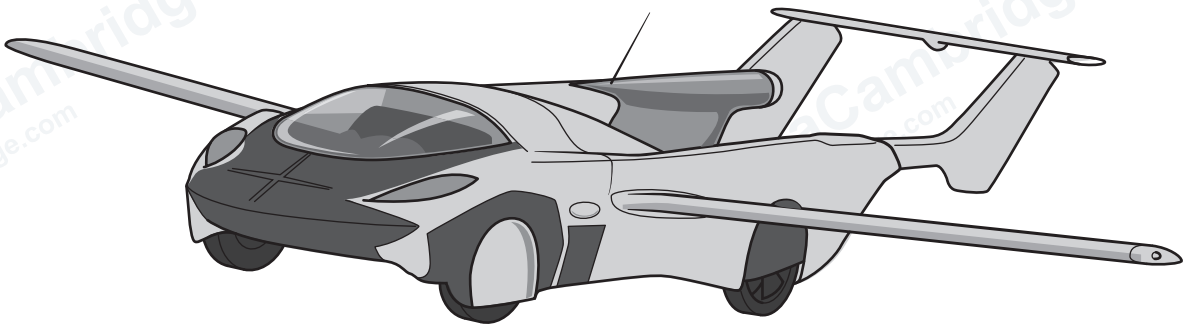

Figure 2.3

AirCar can carry two people and is powered by petrol fuel. Petrol is a carbon-based fuel.

AirCar can drive on roads and fly in the air.

(i) Suggest why AirCar might **not** reduce the impact of climate change.

.....

..... [1]

(ii) Suggest **two** benefits of AirCar.

Give a reason for each suggestion.

1 .....

.....

.....

2 .....

.....

.....
[2]

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(d) Emissions from vehicles can cause acid deposition.

Figure 2.4 shows the sources and formation of acid deposition.

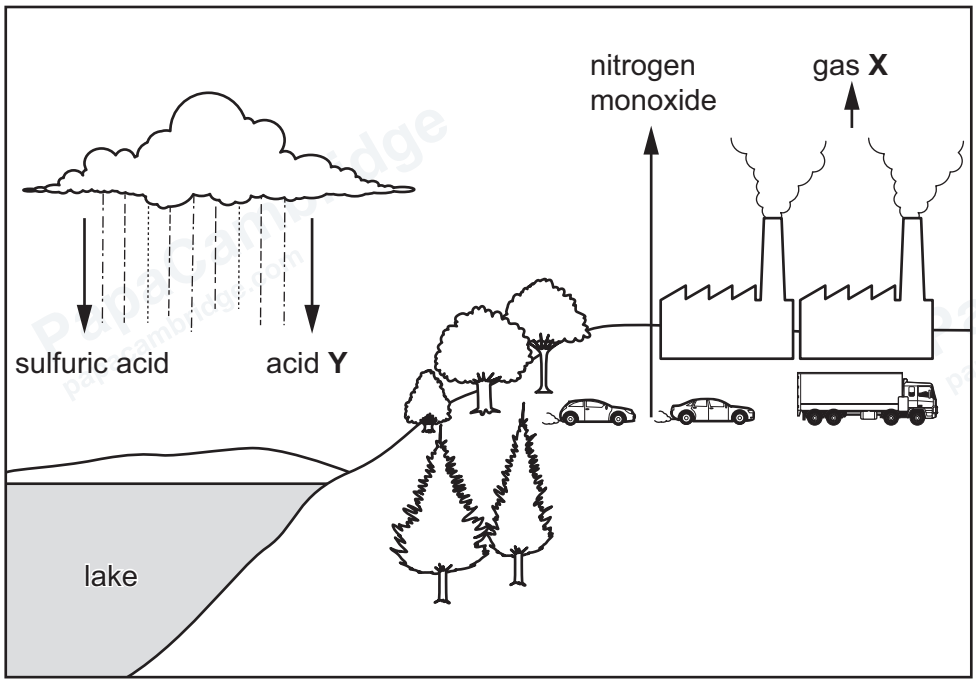

Figure 2.4

(i) Circle the pH at which deposition is defined as acid deposition.

> 5.6 **< 5.6** **7.0** **> 7.0**

[1]

(ii) State **one** type of dry acid deposition.

..... [1]

(iii) Use Figure 2.4 to explain how the nitrogen monoxide in the atmosphere is formed.

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..... [3]

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(iv) Gas **X** on Figure 2.4 causes acid deposition and is formed from the combustion of fossil fuels.

Name gas **X**.

..... [1]

(v) Name acid **Y** shown on Figure 2.4.

..... [1]

(vi) Describe **one** impact of acid deposition on aquatic environments.

.....

.....

..... [1]

(e) Nitrogen monoxide and other oxides of nitrogen cause photochemical smog.

(i) Name the type of compound that reacts with oxides of nitrogen to form photochemical smog.

..... [1]

(ii) State why photochemical smog does **not** form at night.

.....

..... [1]

(iii) State **two** impacts of photochemical smog.

1 .....

.....

2 .....

.....

[2]

[Total: 23]

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3 **(a)** The graph in Figure 3.1 shows the annual carbon emissions (CO_2) from vehicle and industry emissions for four countries.

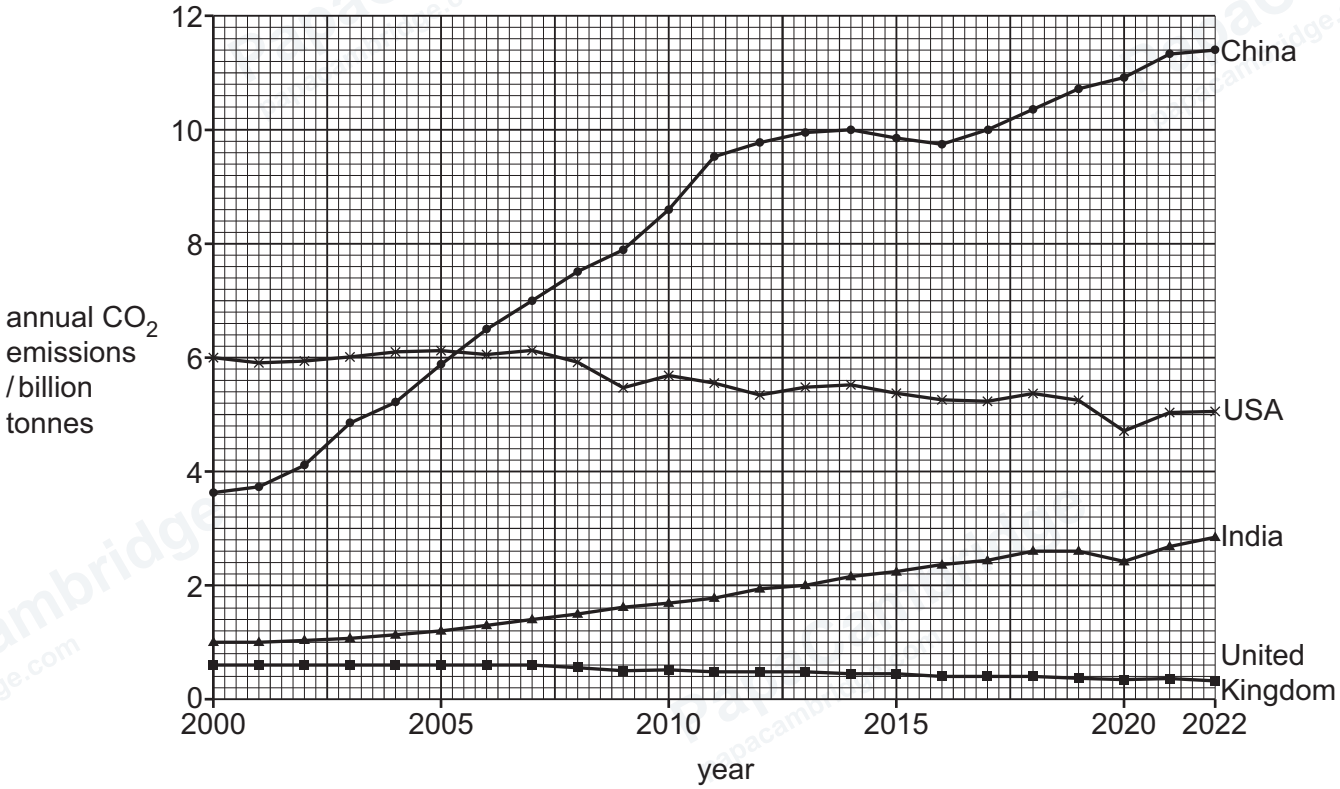

Figure 3.1

(i) In 2022, the annual carbon emissions for China were 11.4 billion tonnes and for the United Kingdom they were 318.7 million tonnes.

Suggest **two** reasons for this difference.

1 .....

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2 .....

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[2]

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(ii) Compare the overall trends shown in Figure 3.1.

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..... [3]

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(b) Figure 3.2 shows the carbon footprint for one day for a person in a country with a high income economy.

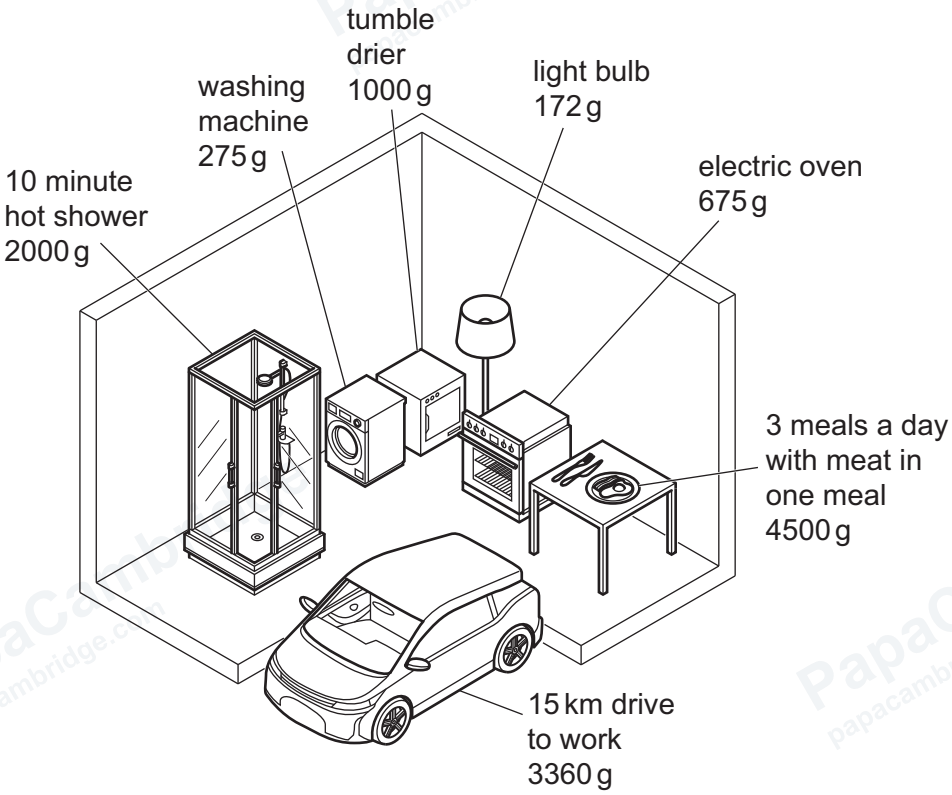

Figure 3.2

Use Figure 3.2 to explain **three** ways this person can reduce their daily carbon footprint.

1 .....

.....

2 .....

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3 .....

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[3]

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(c) A digital carbon footprint is a measure of the greenhouse gas emissions that result from the production of, use of, and data transmission for electronic devices such as computers, tablets and smart phones.

Suggest **two** ways greenhouse gases are emitted as part of this digital carbon footprint.

1 .....

.....

.....

2 .....

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..... [2]

(d) Geo-engineering strategies are used to counteract climate change.

Outline how stratospheric aerosols can counteract climate change.

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..... [3]

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(e) Figure 3.3 is a computer model to predict how different strategies impact climate change.

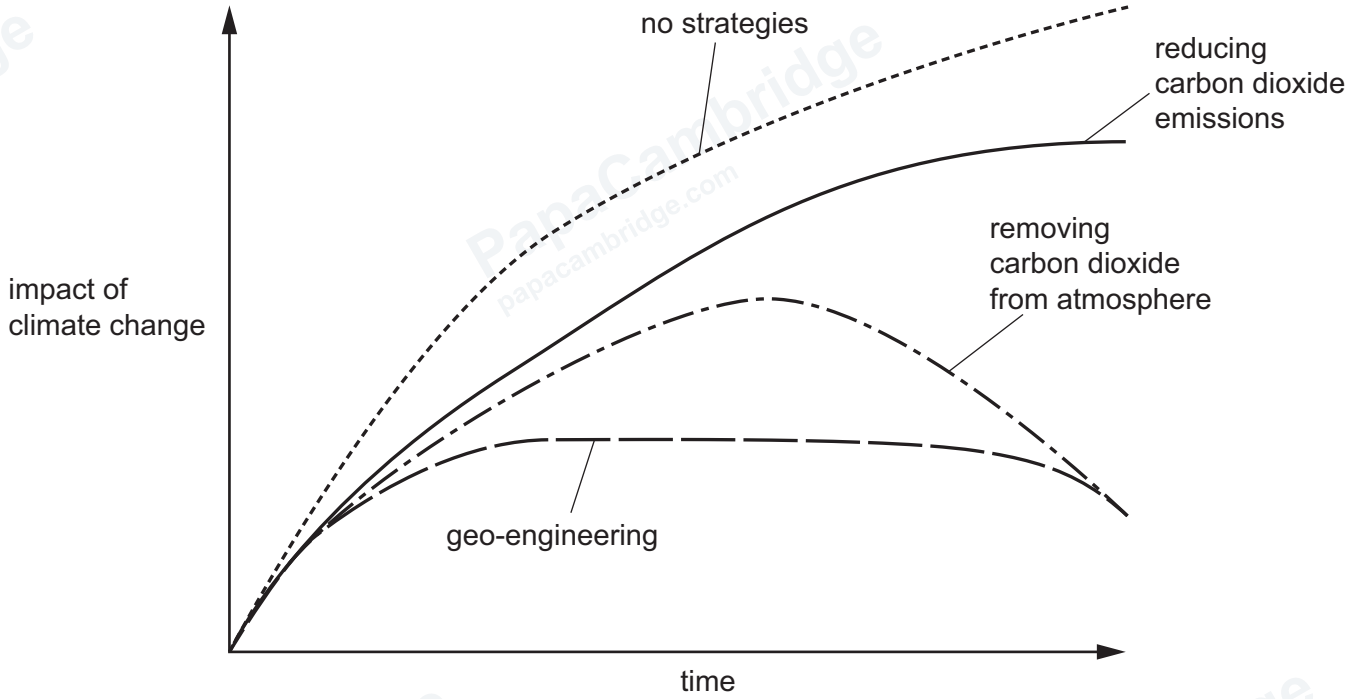

Figure 3.3

(i) Compare the predicted effectiveness of the strategies shown in Figure 3.3 on the impact of climate change.

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..... [3]

(ii) State why different computer climate models give different predictions for future climates.

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..... [1]

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(iii) State **two** other reasons why predicting future climate change is difficult.

1 .....

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2 .....

.....

.....

[2]

[Total: 19]

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4 **(a)** Define the term food security.

.....

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.....

.....

..... [3]

(b) One cause of food insecurity is food wastage.

A researcher investigates food waste in restaurants in Dhaka, Bangladesh.

The data is collected from restaurants using a questionnaire.

Table 4.1 shows the results.

Table 4.1

source of food waste	percentage	rank order
preparation of food	15	
over ordering of ingredients	12	
food spoilage	13	
excess food portion size	4	
left on customer plates	56	

(i) In Table 4.1, order the sources of food waste in rank order.

Rank your answers from 1 to 5. A rank of 1 is the highest. [1]

(ii) Another researcher wants to repeat this investigation.

Suggest **two** facts about these restaurants that are needed to repeat this investigation.

1 .....

.....

2 .....

.....

[2]

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(c) A student plots the data as a pie chart.

Figure 4.1 shows the pie chart the student plots.

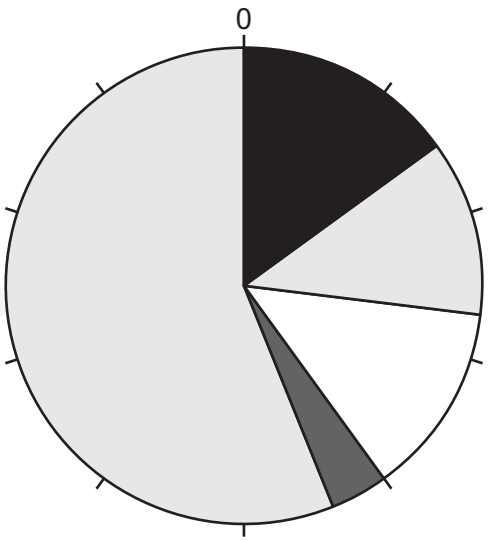

Figure 4.1

The student has made some errors in their presentation of this pie chart.

State **two** ways to improve the presentation of the pie chart.

1 .....

.....

.....

2 .....

.....

.....

[2]

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(d) A scientist investigates how temperature affects the growth rate of bacteria on fresh fish.

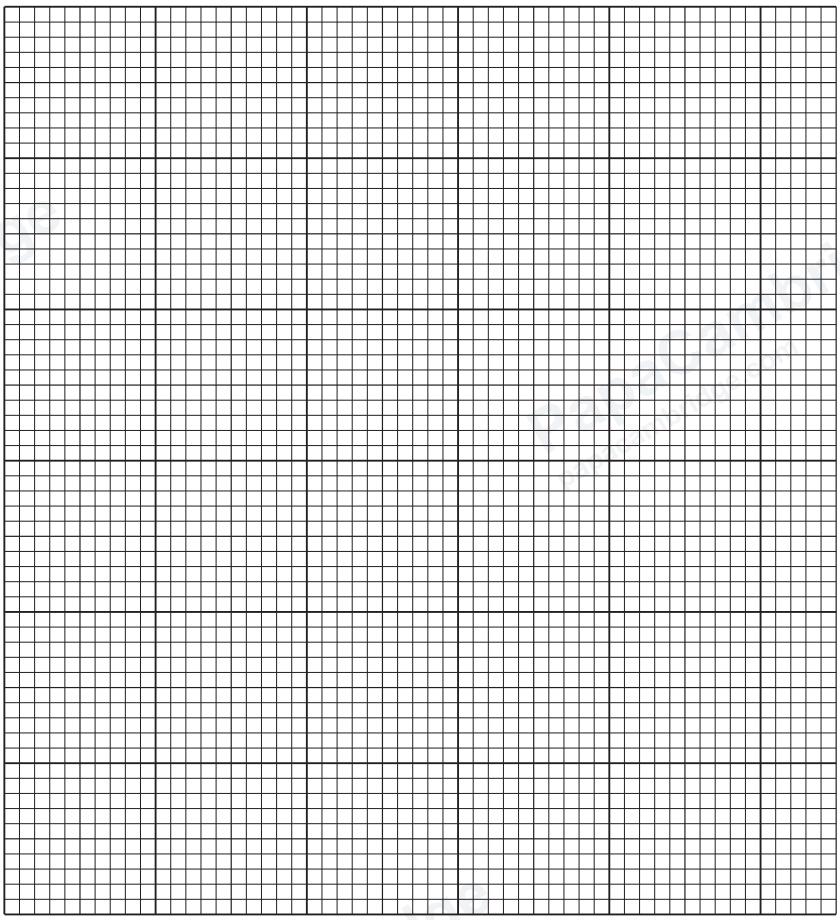
Table 4.2 shows the results.

Table 4.2

temperature / °C	growth rate / arbitrary units
0	0.07
5	0.10
10	0.20
15	0.31
20	0.50

Plot the data as a line graph.

Make temperature the *x*-axis.



[3]

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(e) Figure 4.2 shows the impact of different strategies for increasing the storage time before fresh fish spoils.

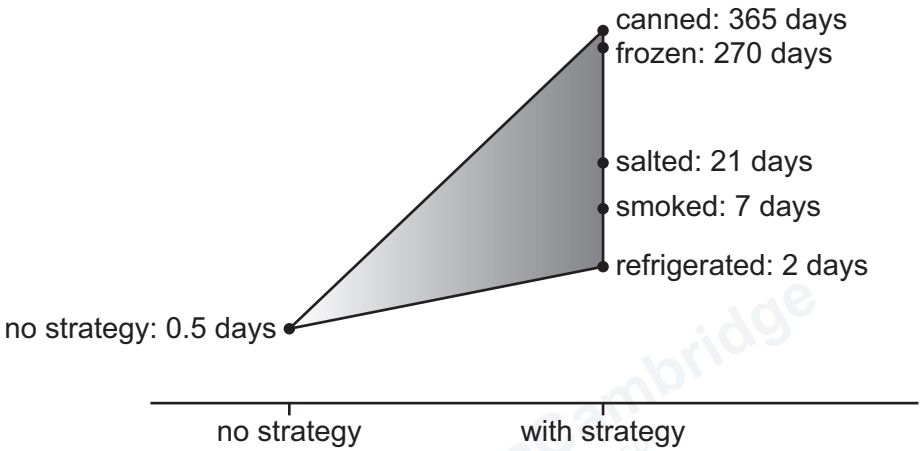

Figure 4.2

(i) The canned strategy stores fish in sealed metal containers.

Suggest **one** limitation of the canned strategy.

.....

.....

..... [1]

(ii) Suggest **one** reason why the frozen strategy is **not** used in remote rural locations.

.....

.....

..... [1]

(iii) Suggest **one** limitation with the salted and smoked strategies.

.....

.....

..... [1]

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(f) Increasing food production by intensification is a strategy for managing food security.

Describe what is meant by intensification of food production.

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..... [2]

(g) State why an increase in demand for biofuels can increase food insecurity.

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..... [1]

[Total: 17]

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