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ENVIRONMENTAL MANAGEMENT **0680/23**

Paper 2 Management in Context **October/November 2024**

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 **20** pages. Any blank pages are indicated.

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world map showing the location of Chile



map of Chile

Key

- ★ capital city
- • major city
- international boundary
- Atacama Desert



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Area of Chile: 756 102 km^2

Population of Chile: 18 430 408 (in 2022)

Children per woman: 1.76

Life expectancy: 79.8 years

Currency: Chilean peso (1 USD = 889 Chilean pesos)

Language: Spanish

Climate of Chile: the Atacama Desert in the north is one of the driest places on Earth, with an average annual rainfall of less than 0.05 mm; the central region has warm dry summers and short wet winters; the south is cool and wet

Terrain of Chile: fertile central valley, low mountains along the coast, high mountains in the east

Main economic activities of Chile: mining (copper, lithium, gold), agriculture (grapes, apples, potatoes), manufactured goods

Chile is one of the world's largest producers of copper and lithium. Most mining is in the Atacama Desert.

90% of the population live in the central region. The population has access to safe water and sanitation. Tourism is a growing industry, especially in the south where there are lakes, volcanoes and ancient forests. Santiago, Valparaíso and the Atacama Desert are popular tourist destinations.

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1 **(a)** The populations of the five largest cities in Chile in 2022 are shown in the table.

city	population
Santiago	7 200 000
Valparaíso	979 000
Concepción	945 000
La Serena	412 000
Antofagasta	390 832

(i) Calculate the percentage of the total population of Chile that lived in Santiago in 2022.

.....% [1]

(ii) Calculate the total population of the cities in the table.

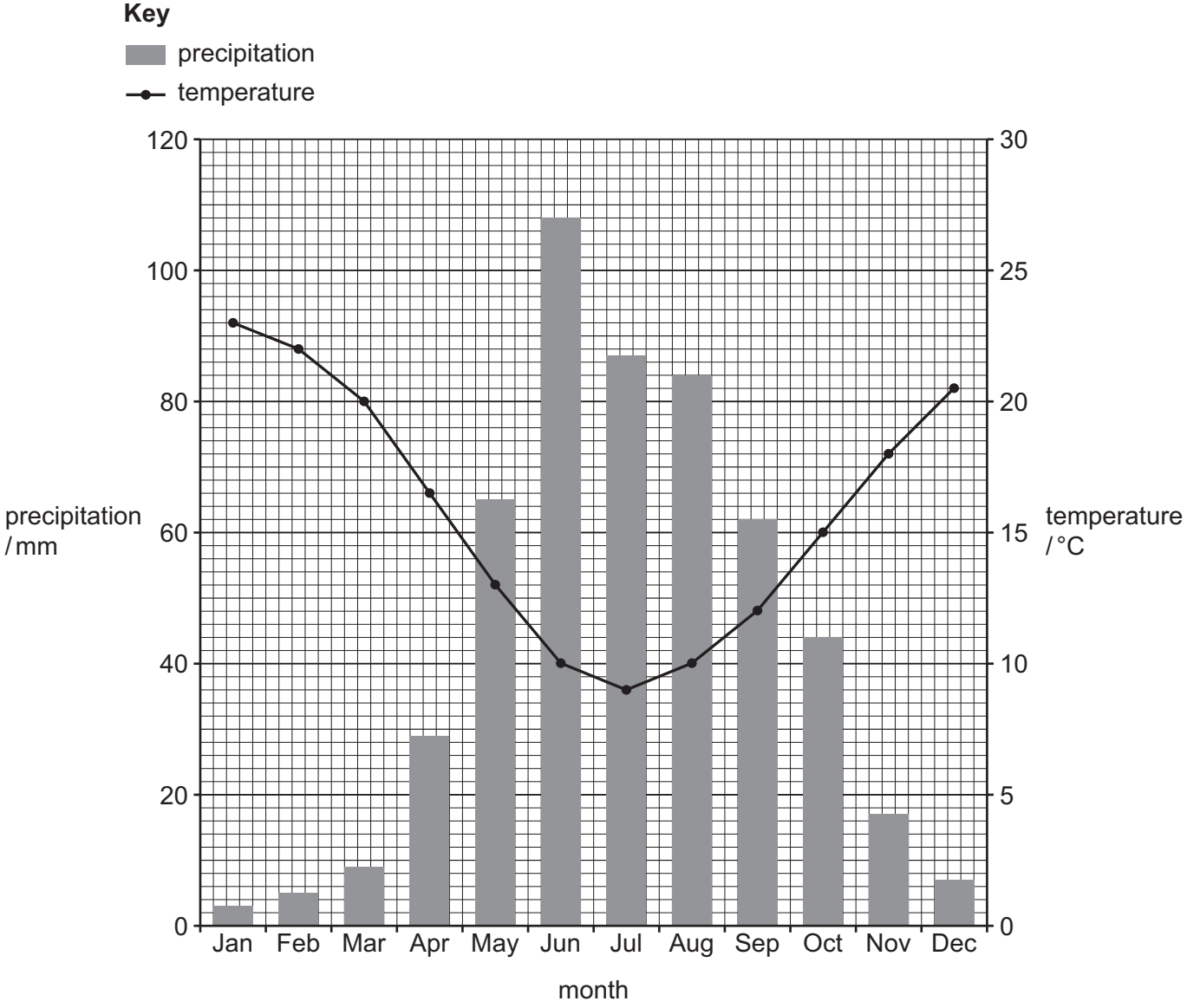
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(b) The graph shows climate data from a weather station in the central region of Chile.



(i) Calculate the annual temperature range at this weather station.

..... °C [1]

(ii) Circle the total annual precipitation at this weather station.

120 mm **220 mm** **320 mm** **420 mm** **520 mm**

[1]

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(iii) A farmer grows vegetables near the weather station.

Explain why there is good crop growth from November to April.

Use the climate data to support your answer.

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..... [4]

(iv) State **three** factors that attract young people to migrate to Santiago from rural areas.

1 .....

2 .....

3 .....

[3]

(v) State the term used to describe the increase in the number of people living in urban areas compared to rural areas.

..... [1]

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(c) Some people in Santiago live in informal settlements. These are places where people have built homes on land they do not own.

(i) Suggest **two** benefits of living in an informal settlement.

1 .....

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2 .....

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[2]

(ii) Suggest **two** negative impacts of living in an informal settlement.

1 .....

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2 .....

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[2]

(iii) The population of Santiago is 7 200 000.

A report states that 9% of the population of Santiago live in informal settlements.

Calculate the number of people in Santiago that live in informal settlements.

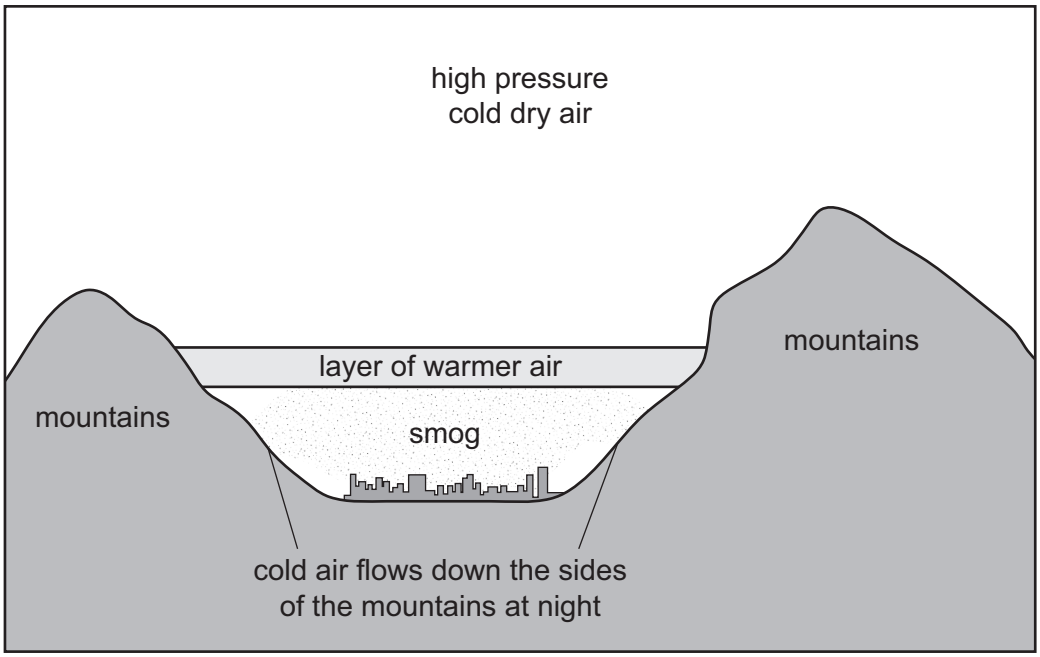
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(d) Santiago is in the central valley, 570 m above sea level.

Smog can be a problem in the winter.

The diagram shows the causes of smog in Santiago.



(i) Name **one** type of compound that causes smog.

..... [1]

(ii) State **one** source of a type of compound that causes smog.

..... [1]

(iii) Describe how smog forms in Santiago.

Use the diagram to support your answer.

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(e) A student reads a report about smog causing air quality to reach dangerous levels.

In 2018, the city authorities introduced strategies to reduce the formation of smog.

The student investigates improvements in the health of people since 2018.

The student considers three methods.

method one:

- Ask people shopping in the centre of Santiago if their health has improved since 2018.

method two:

- Give questionnaires to 100 people living in every other house in roads near the centre of Santiago.
- Include questions about how long they have lived in the city and their health since 2018.

method three:

- Randomly select 10 doctors with patients living near the centre of Santiago.
- Interview the doctors about the health of their patients since 2018.

(i) Suggest **two** reasons why the student decides **not** to use method one.

1 .....

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2 .....

.....

[2]

(ii) Suggest **two** ways method three is better than method two.

1 .....

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[2]

(f) State **two** effects of smog on human health.

1 .....

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2 .....

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[2]

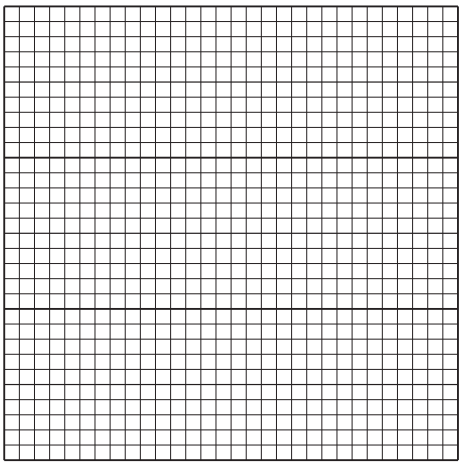
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2 **(a)** The table shows the largest producers of copper in 2022.

country	copper /million tonnes
Chile	5.8
Peru	2.4
China	1.6
Democratic Republic of Congo (DRC)	1.2
United States of America (USA)	1.2

(i) Plot a bar chart of the data.



[4]

(ii) A mining company is considering opening a new copper mine.

State **three** factors that affect the decision to extract minerals such as copper.

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(b) The photograph shows a copper mine in the Atacama Desert in Chile.



(i) Describe how rock containing copper is extracted.

Use the photograph to support your answer.

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(ii) The rock extracted contains 3% copper.

This rock is processed near the mine to extract the copper.

Suggest **one** reason why the processing plant is near the mine.

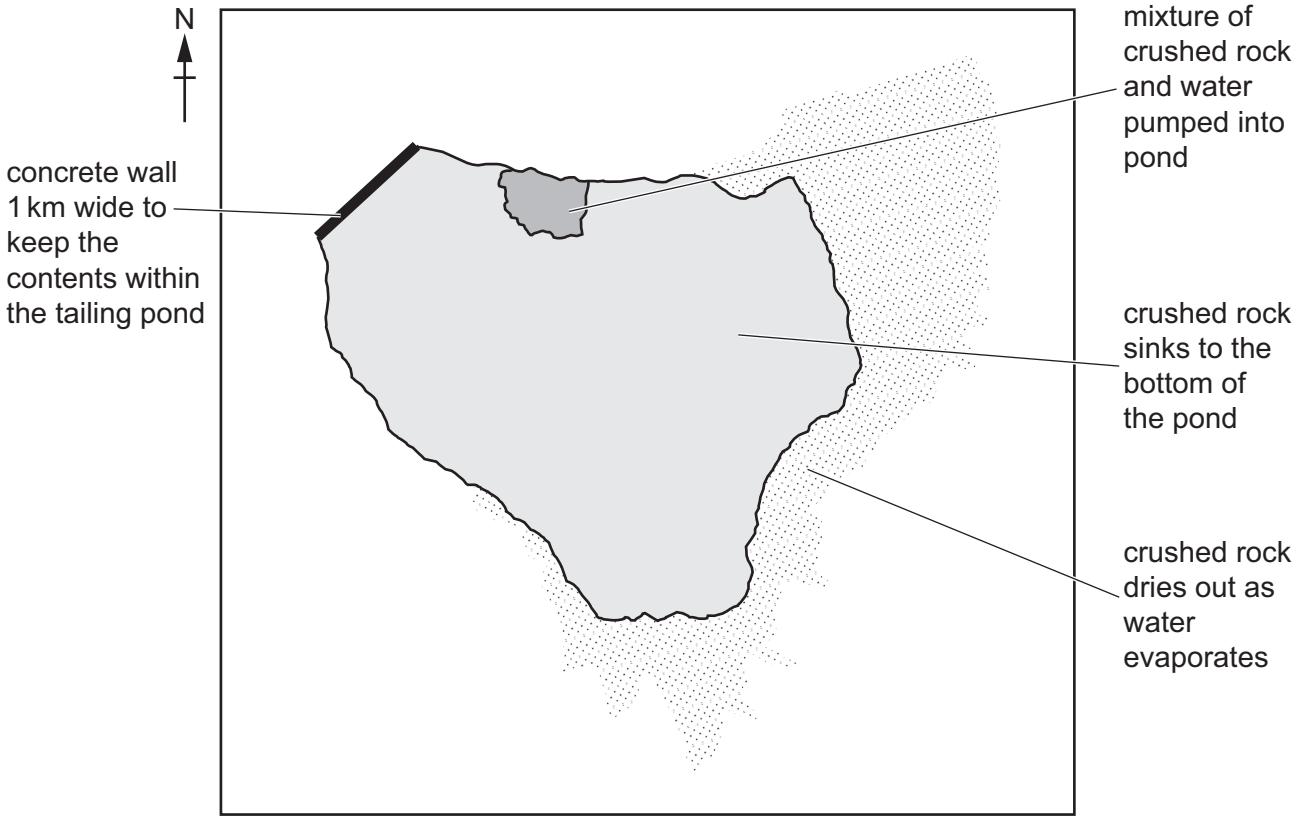
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(iii) The waste materials left after the copper is extracted are called tailings. Tailings are a toxic mixture of crushed rock and water. The mixture is taken to tailing ponds near the mine.

The diagram shows a tailing pond in the desert near the mine.



Suggest reasons why there are no people living to the north-west of the tailing pond in the diagram.

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..... [3]

(c) Chile has large reserves of lithium.

Lithium is used in batteries.

(i) In 2021, the global demand for lithium was 389 200 tonnes. Global demand is predicted to rise to 2 150 000 tonnes by 2030.

Calculate the percentage increase in the demand for lithium by 2030.

.....% [2]

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(ii) Lithium salts are found in underground deposits.

The photograph shows the extraction of lithium salts in the Atacama Desert.



Statements **A**–**F** describe how lithium is extracted from lithium salts.

The statements are **not** in the correct order.

A ground water is pumped to the surface
B lithium salts are dissolved in ground water
C the water is evaporated by the Sun
D lithium salts remain as a white powder
E the lithium salts are exported to China for processing
F the ground water is put into large ponds

Write the letters of statements **A**–**F** in the correct order.

The first one has been completed.

1 **B**	2	3	4	5	6 .....

[3]

(d) Suggest **two** reasons why only a small number of lithium batteries are recycled.

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[2]

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(e) The fact sheet shows information about flamingos in the Atacama Desert.

Flamingos

Flamingos live in large groups on lakes in the Atacama Desert near to where lithium salts are extracted.

Flamingos feed on shrimp. Shrimp feed on algae. Foxes and wild cats are predators of flamingos.

Some lakes in the Atacama Desert are drying up.



(i) Use the fact sheet to write a food chain with four trophic levels that includes flamingos.

..... [2]

(ii) Explain why the organism at the first trophic level in a food chain is a producer.

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..... [2]

(iii) Mining and predation decrease the population of flamingos.

Suggest **three** other factors that decrease the population of flamingos.

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(f) The Peruvian fox lives in the Atacama Desert.

This area has been very dry for millions of years.



Explain why Peruvian foxes need to feed as primary consumers, secondary consumers and on dead organisms.

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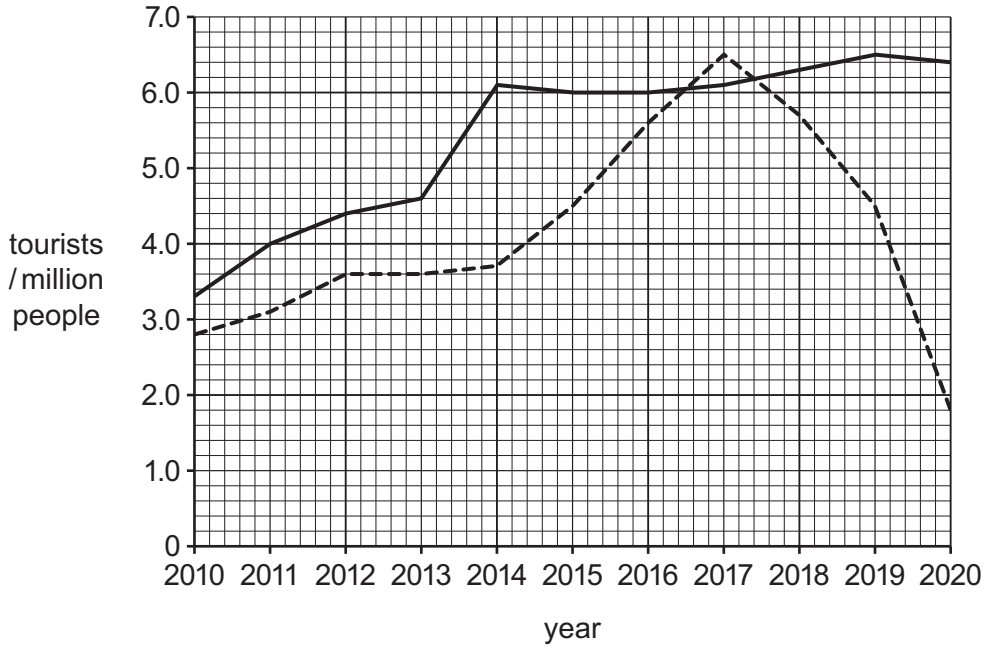
3 **(a)** The graph shows the number of domestic and international tourists staying in hotels in Chile between 2010 and 2020.

Domestic tourists live in Chile.

Key

——— domestic tourists

– – – – – international tourists



(i) Describe the trends for domestic tourists shown in the graph.

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(ii) Suggest **three** reasons why the government of Chile wants the number of international tourists to increase.

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(b) Many tourists walk on trails in national parks in Chile.

Tourists compact the soil as they walk along a trail. This causes the plants on the trail to die.

Some tourists walk at the side of the trail. This makes the trail wider.

(i) Describe how a tape measure, a quadrat and a ruler are used to investigate the height of plants along one 10 m transect across the trail.

tape measure .....

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quadrat .....

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ruler .....

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[3]

(ii) Suggest **three** ways to improve this investigation.

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[3]

(iii) Suggest **three** ways of protecting walking trails from damage by tourists.

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(c) Describe how tourism increases water pollution.

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(d) Ecotourism is popular in Chile.

Tick (✓) **three** boxes that are examples of ecotourism.

eating locally produced food ☐

eating all meals in a large hotel ☐

sunbathing ☐

watching birds ☐

visiting biosphere reserves ☐

visiting zoos ☐

visiting cinemas ☐

[2]

(e) The government of Chile is developing sustainable tourism.

Explain what is meant by sustainable tourism.

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