



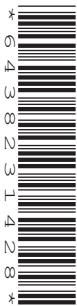
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ENVIRONMENTAL MANAGEMENT

8291/13

Paper 1 Principles of Environmental Management

October/November 2025

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Section A: answer **all** questions.
- Section B: answer **one** question.
- 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.

Section A

Answer **all** questions in this section.

1 (a) Fig. 1.1 shows the population density of countries in 2023.

Key

people per km ²	population density
0–9	low
10–199	medium
200–1500	high

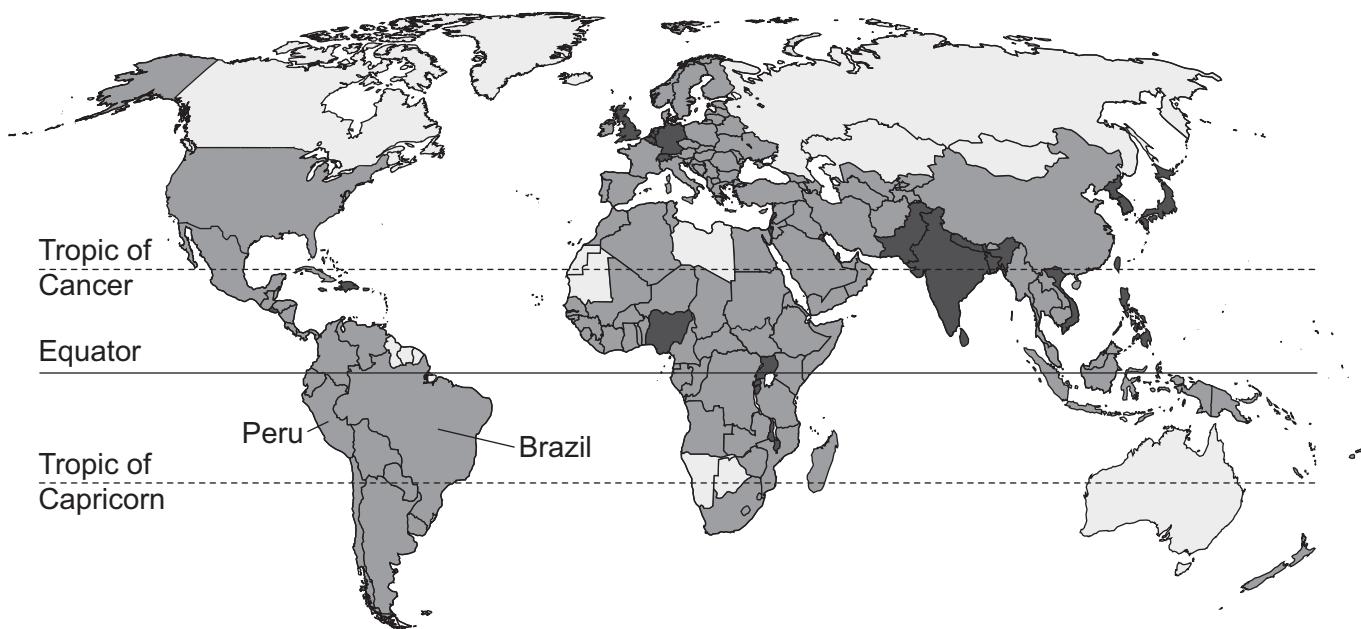


Fig. 1.1

(i) Describe the distribution of population density shown in Fig. 1.1.

[3]





(ii) A student concludes that the number of people per km^2 in Peru and Brazil is the same.

State **one** piece of evidence shown in Fig. 1.1 that supports this conclusion and **one** piece of evidence that does **not** support this conclusion.

support

.....

does **not** support

.....

[2]

(iii) Table 1.1 shows data for Botswana, Africa, in 2023.

Table 1.1

population /number of people	area of country / km^2	population density /people per km^2	population density as shown in the key on Fig. 1.1
2 384 246	581 730		

Complete Table 1.1:

- calculate the population density
- use the key in Fig. 1.1 to determine the population density as low, medium or high.

[2]

(b) Environmental, economic and social factors influence population density within a country.

State **one** example for each of these factors.

environmental

economic

social

[3]



(c) Fig. 1.2 shows the population structure of a country in 2023.

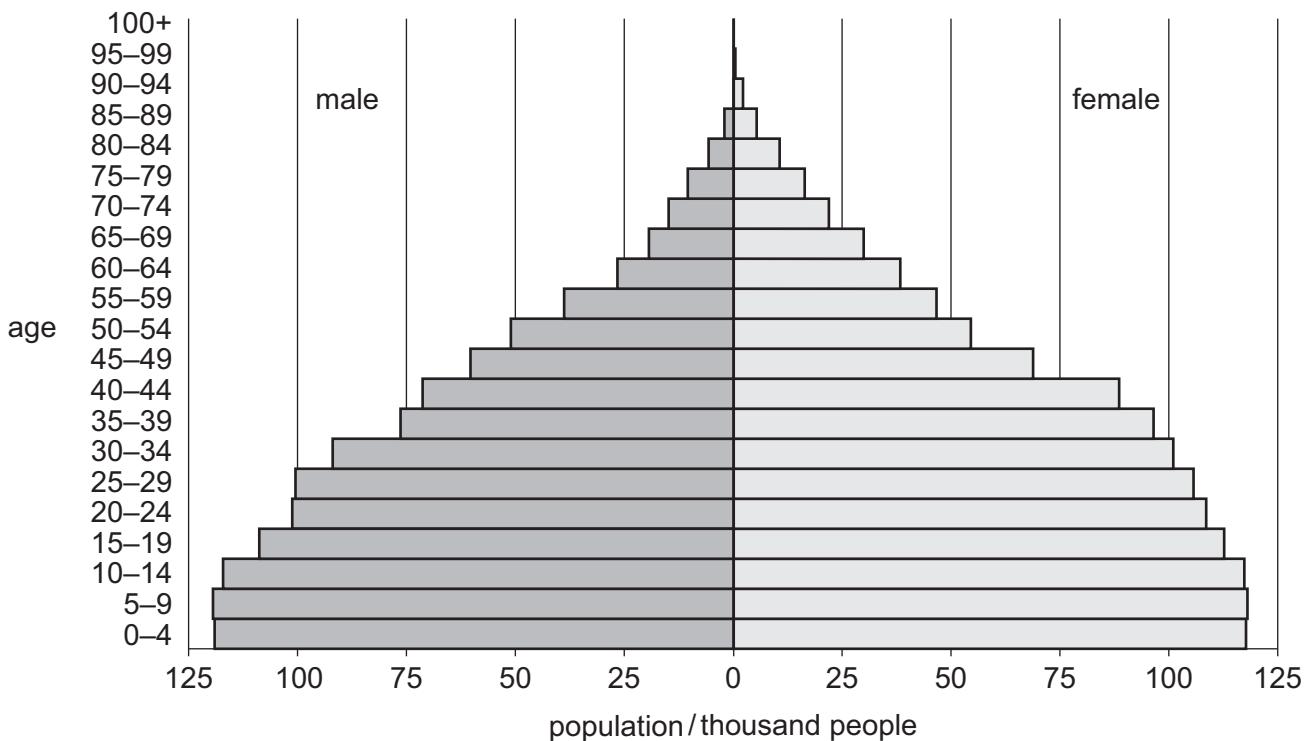


Fig. 1.2

(i) **Circle** the income group of the country in Fig. 1.2.

LIC

MIC

HIC

[1]

(ii) Explain your choice of income group in (c)(i).

[2]

(d) Some countries have an ageing population.

State **three** impacts of an ageing population on a country.

1

.....

2

.....

3

[3]

[Total: 16]





2 (a) Many governments aim to improve long-term energy security.

(i) Describe what is meant by long-term energy security.

.....
.....
.....
.....
.....

[3]

(ii) Piracy affects energy security.

Explain how piracy affects energy security.

.....
.....
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.....
.....

[2]

(iii) Reliance on fossil fuels is one strategy for managing energy security.

Describe benefits and limitations of this strategy for managing energy security.

benefits

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limitations

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[4]

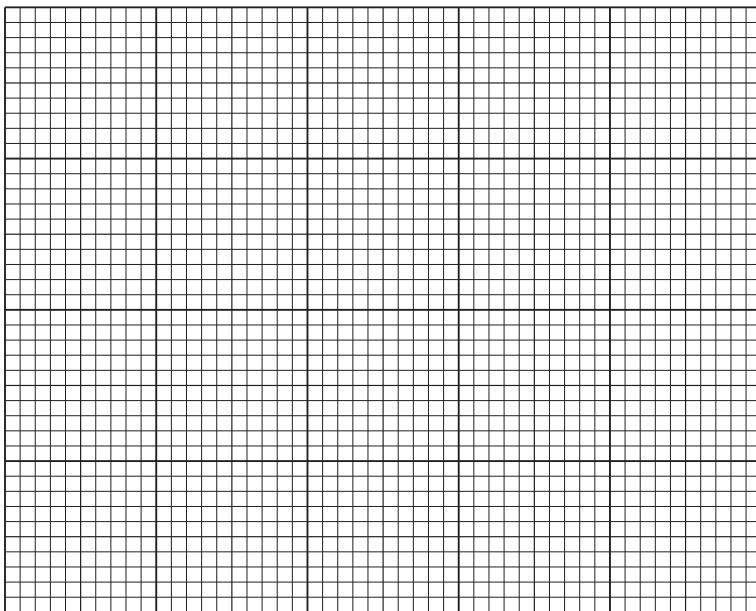


(b) Table 2.1 shows the percentage of the population of Papua New Guinea that had access to electricity for a minimum of four hours per day between 2000 and 2021.

Table 2.1

year	percentage of the population
2000	8
2003	15
2006	12
2009	17
2012	35
2015	
2018	55
2021	60

(i) Plot a line graph of the data in Table 2.1.



[4]

(ii) Use your graph to estimate the percentage of the population of Papua New Guinea that had access to electricity for a minimum of four hours per day in 2015.

..... % [1]



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(iii) Suggest **two** ways that the change in access to electricity from 2000 to 2021 will impact the people of Papua New Guinea.

1

.....

2

.....

[2]

[Total: 16]



3 A hydroponic system is a controlled environment for growing food.

(a) Fig. 3.1 shows a hydroponic system for growing strawberry plants.



Fig. 3.1

(i) The strawberry plants in this hydroponics system compete with each other.

Suggest how this hydroponics system reduces competition between strawberry plants.

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.....
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.....
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[4]





(ii) Reducing competition is a benefit of hydroponics systems.

Describe other benefits and limitations of hydroponics systems.

benefits

.....

.....

.....

.....

limitations

.....

.....

.....

.....

[4]

(b) Hydroponics is one strategy for managing food security.

(i) Define food security.

.....

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.....

[2]

(ii) State **three** strategies, other than hydroponics, for managing food security.

1

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2

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3

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[3]

[Total: 13]



4 (a) Fig. 4.1 shows the structure of the Earth's atmosphere.

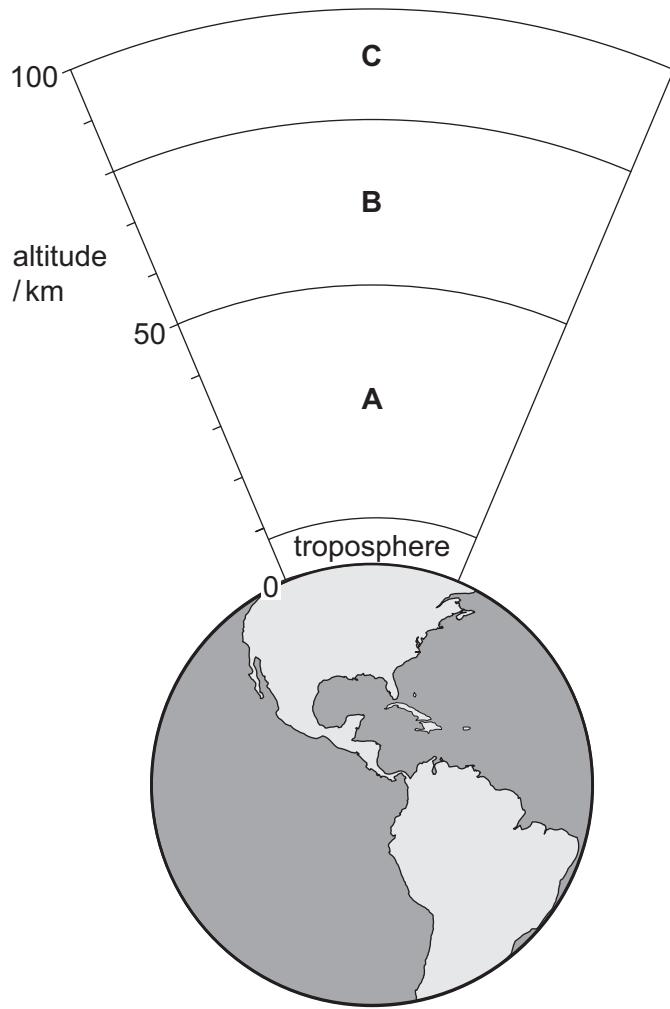


Fig. 4.1

(i) Use Fig. 4.1 to determine the maximum altitude of the troposphere.

..... km [1]

(ii) Identify the letter, **A**, **B** or **C**, on Fig. 4.1 that contains the ozone layer.

..... [1]



(b) A student says:

Ozone can be harmful to human health
but it can also prevent harm.

(i) Describe how ozone harms human health.

.....
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.....
.....
.....
.....

[3]

(ii) Explain how ozone prevents harm to humans.

.....
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[3]



(c) An ozone hole is an area where the mean concentration of ozone is below 100 Dobson Units.

Fig. 4.2 shows the mean area of the Antarctic ozone hole between 1980 and 2022.

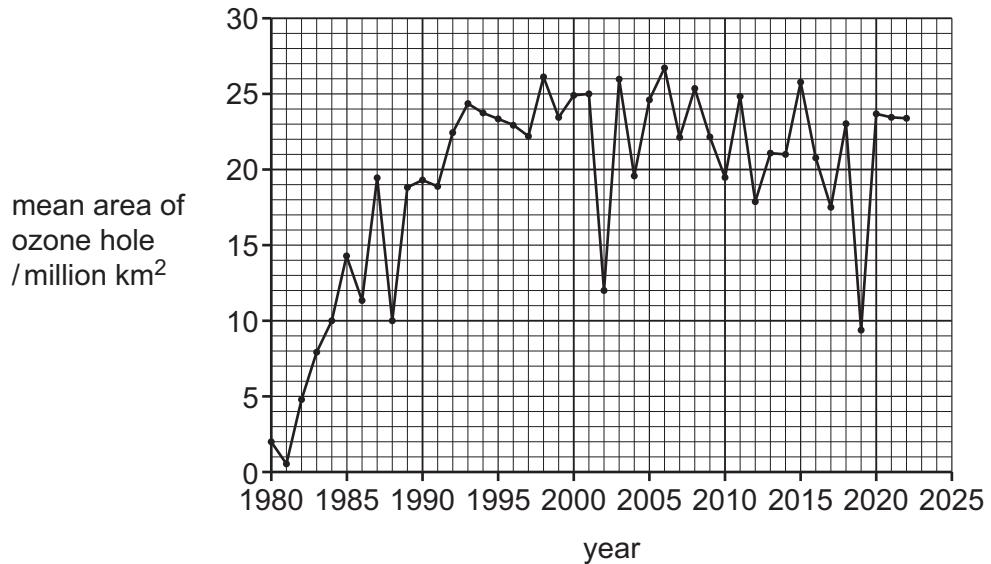


Fig. 4.2

(i) Describe the overall trend in the mean area of the Antarctic ozone hole between 1980 and 2022.

.....

 [2]

(ii) Calculate the percentage increase in the mean area of the Antarctic ozone hole between 1980 and 2000.

..... [2]



(d) Describe how ozone depletion occurs.

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[3]

[Total: 15]



Section B

Answer **one** question.

EITHER

5 'Local human activities have a greater impact on tropical rainforests than the impact of global climate change on tropical rainforests.'

To what extent do you agree with this statement?

Give reasons and include information from relevant examples to support your answer.

[20]

OR

6 Evaluate the success of legislation and protocols as methods of conserving biodiversity.

Give reasons and include information from relevant examples to support your answer.

[20]



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