Cambridge Assessment International Education

Cambridge International AS Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

ENVIRONMENTAL MANAGEMENT **8291/13**

Paper 1 Principles of Environmental Management **May/June 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 **24** pages. Any blank pages are indicated.

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[Turn over

Section A

Answer **all** questions in this section.

1 Fig. 1.1 shows subsistence agriculture. The subsistence farmer grows rice in flooded fields.

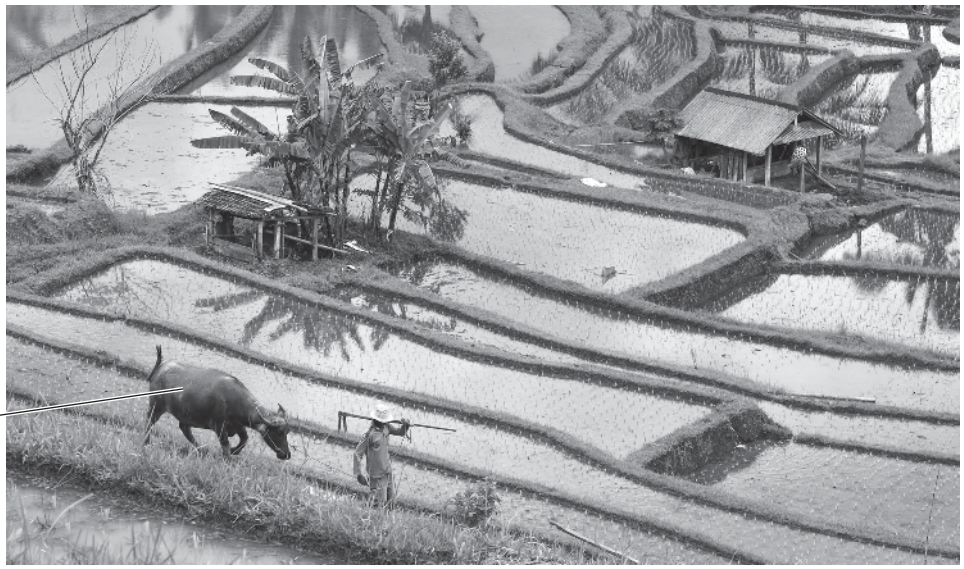

Fig. 1.1

(a) (i) Identify **three** features of subsistence agriculture shown in Fig. 1.1.

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[3]

(ii) Subsistence agriculture is one strategy for managing food security.

Describe **two** ways that the farmer shown in Fig. 1.1 can improve his food security.

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..... [2]

(b) Rice plants are part of the carbon cycle.

(i) Rice plants respire aerobically.

State the chemical equation for aerobic respiration.

..... [2]

(ii) The decomposition of rice plants in flooded fields releases methane gas.

Explain how methane gas contributes to the enhanced greenhouse effect.

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(iii) State **two** ways rice plants are part of the carbon cycle, other than respiration and decomposition.

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[2]

(c) Water buffalo are used in sustainable agriculture.

Explain **two** ways that water buffalo improve the sustainability of agriculture.

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..... [4]

[Total: 16]

2 **(a)** Fig. 2.1 shows a shrew.

Fig. 2.1

A scientist investigates the population of shrews in three different ecosystems using a capture-mark-recapture technique.

Table 2.1 shows the results of the investigation.

Table 2.1

ecosystem	number of individuals captured in first sample n_1	number of individuals (marked and unmarked) captured in second sample n_2	number of marked individuals recaptured in second sample m_2	Lincoln index N
woodland	35	42	5	294
wetland	5	9	1	45
grassland	30	34	2	

(i) Calculate the Lincoln index, N, for the grassland ecosystem using the formula:

$$N = \frac{n_1 \times n_2}{m_2}$$

N = estimate of population size
n_1 = number of individuals captured in first sample
n_2 = number of individuals (marked and unmarked) captured in second sample
m_2 = number of marked individuals recaptured in second sample

N = ... [1]

(ii) Explain why the Lincoln index is an estimate of the population and **not** an exact value.

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..... [1]

(iii) A student analysed the data in Table 2.1 and concluded that:

'The woodland is more biodiverse than the wetland.'

Explain why the student's conclusion may **not** be valid.

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..... [2]

(b) Describe the benefits and limitations of capture-mark-recapture as a technique for estimating the population of shrews.

benefits .....

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limitations .....

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[4]

(c) The 'Living Planet Index' (LPI) measures the mean percentage change in 31 821 populations of 5230 species.

The LPI for 1970 is 100% because data was first collected in 1970.

An LPI of 80% indicates that the sizes of the populations of the 5230 species have decreased by an average of 20% since 1970.

Fig. 2.2 shows the LPIs of four different regions between 1970 and 2018.

Key
region
- ------- North America
- ——— World
- — — — Africa
- ····· South America and Caribbean

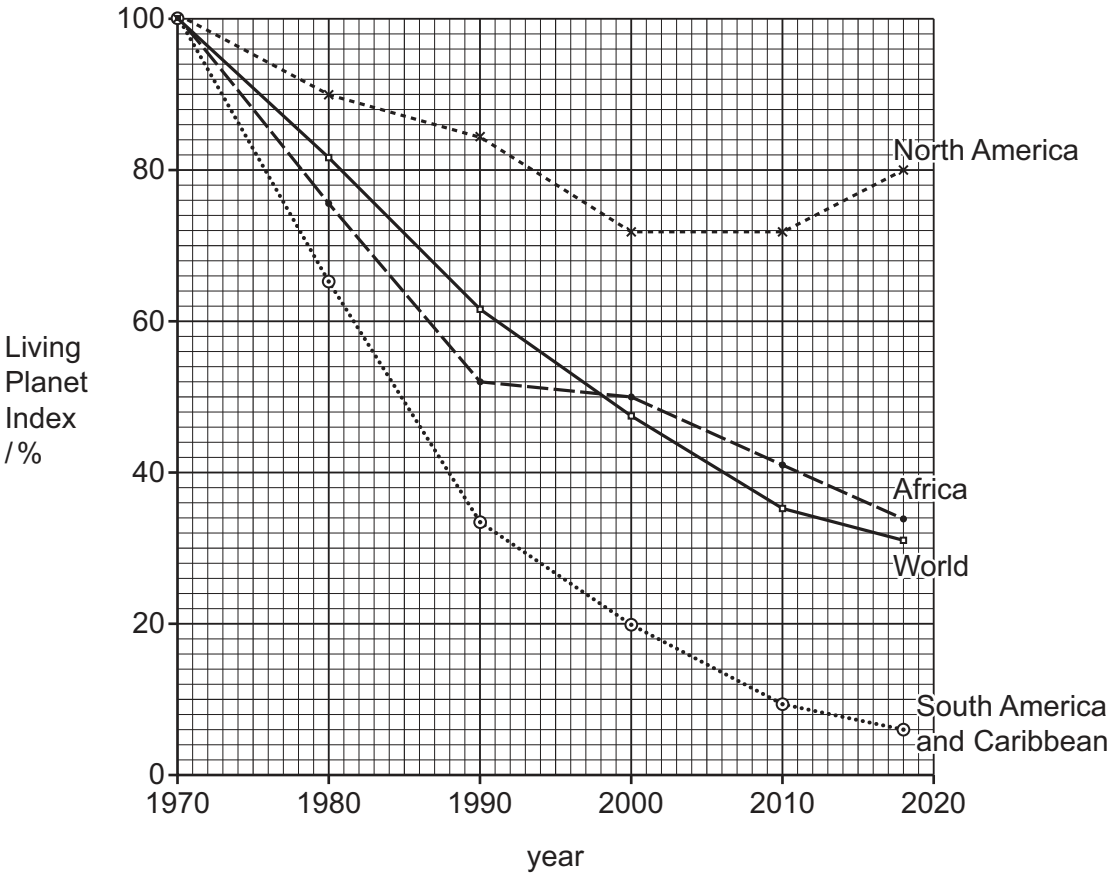

Fig. 2.2

(i) Describe the changes shown by the data in Fig. 2.2.

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(ii) State **three** benefits of conserving biodiversity.

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[3]

[Total: 14]

3 Fig. 3.1 shows an oven called a kiln. The kiln uses clay mined locally to make bricks for construction.

Fig. 3.1

It is estimated that kilns use 45 000 tonnes of wood every year as a source of energy in Brazil. Most of the wood comes from deforestation of the Amazon rainforest.

The 'Serragem Project' educates local communities about using biomass from seed husks as a source of energy instead of wood.

Fig. 3.2 shows seeds and seed husks.

Fig. 3.2

(a) Reducing deforestation is one benefit of using biomass from seed husks as a source of energy.

Suggest **three** other benefits of using biomass from seed husks as a source of energy.

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[3]

(b) Suggest the impacts, other than deforestation, that making bricks using kilns has on the ecosystem.

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(c) Fig. 3.3 shows the year-on-year change in energy production from different resources in Brazil between 2020 and 2021.

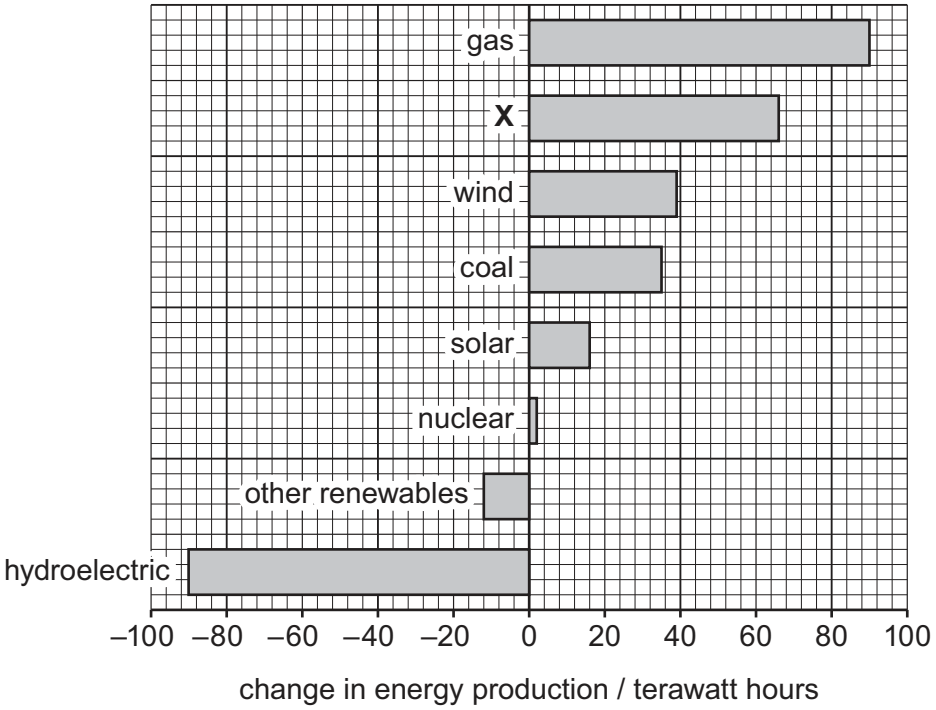

Fig. 3.3

(i) Resource **X** in Fig. 3.3 is non-renewable.

Suggest the name of resource **X**.

..... [1]

(ii) In Fig. 3.3, hydroelectric has a value of –90 terawatt hours.

Suggest why this is a negative value.

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..... [1]

(iii) Use Fig. 3.3 to describe the trend in energy production from non-renewable resources in Brazil between 2020 and 2021.

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..... [1]

(iv) The Brazilian Government aims to improve energy security.

Define energy security.

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(v) State **three** strategies to improve Brazil's energy security.

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[3]

[Total: 17]

4 Fig. 4.1 shows an irrigation system for growing wheat.

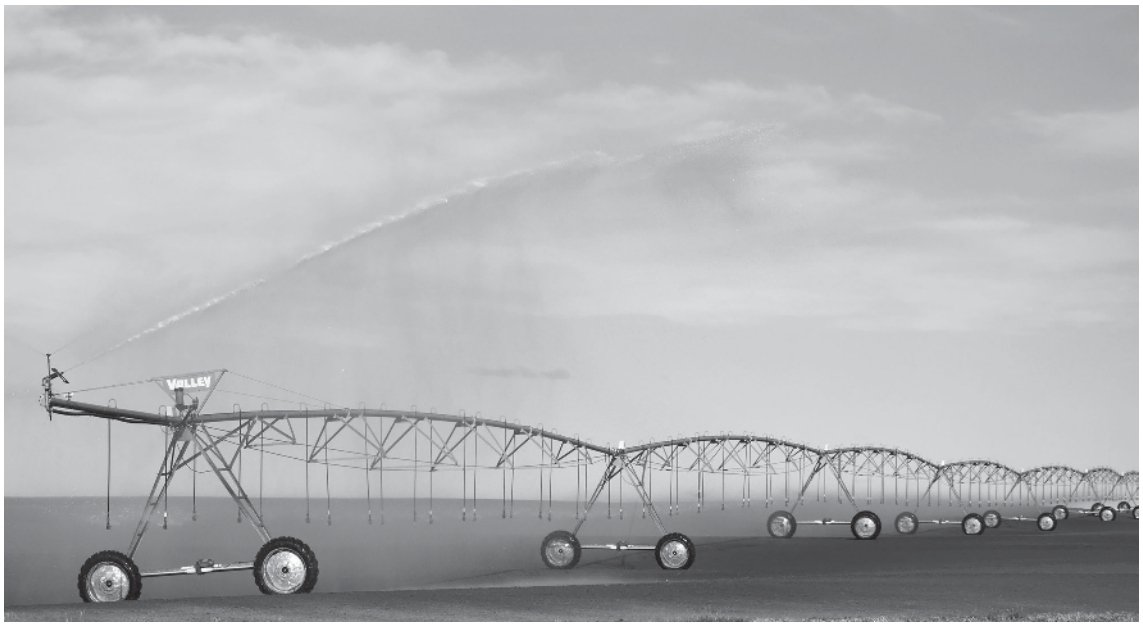

Fig. 4.1

(a) One limitation of this type of irrigation system is that it can cause soil salinisation.

(i) Describe the process of soil salinisation.

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(ii) Suggest the benefits and **other** limitations of this type of irrigation system.

benefits .....

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limitations .....

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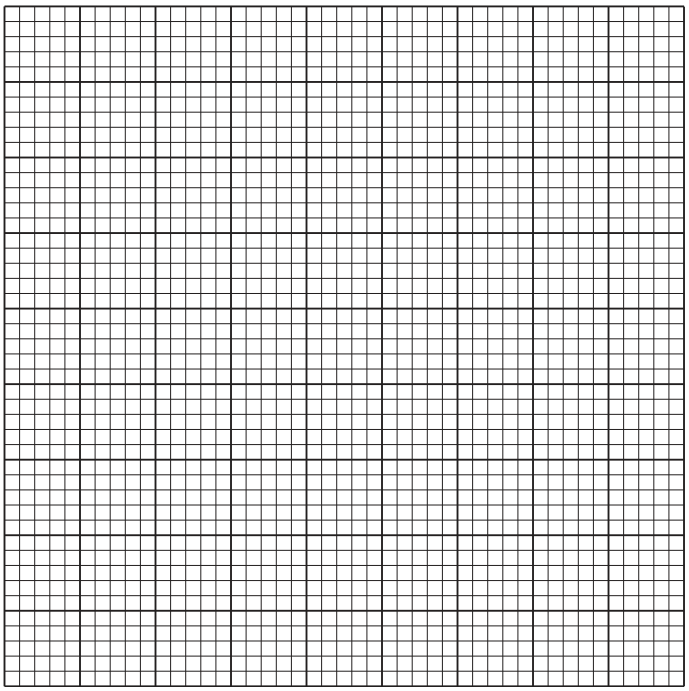
[4]

(b) Table 4.1 shows the yields of wheat when different volumes of water are used for irrigation.

Table 4.1

volume of water for irrigation / m^3 per hectare	yield of wheat / thousand kg per hectare
2000	0.10
3000	0.25
4000	1.00
5000	5.20
6000	7.40
7000	7.60

(i) Plot a line graph to show the yield of wheat against the volume of water for irrigation.



[4]

(ii) Explain why crop yield is dependent on water availability.

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..... [2]

[Total: 13]

Section B

Answer **one** question.

EITHER

5 'Agricultural diseases are the main threat to global food security.'

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 sustainable water extraction and improved water supply as strategies for managing water security.

Give reasons and include information from relevant examples to support your answer. [20]

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