Environmental systems and societies

Standard Level

Paper 2 — Mock Examination

Mock Exam 2

Calculator required

Time allowed: **2 hours**

Maximum mark: **65 marks**

Candidate information

Candidate name: .....

Session number: .....

Date: .....

Topic emphasis: human populations and the demographic transition, urban systems and solid domestic waste, water systems and freshwater management, population dynamics and natural resource use, soils and food production, the carbon cycle, the atmosphere, air pollution and acid deposition.

Instructions to candidates

- Write your session number in the box on the cover.
- Do not open this examination paper until you are told to do so.
- **Section A:** answer **all** questions.
- **Section B:** answer **two** questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[65 marks]**.

The mark allocation is shown in square brackets at the end of each question or part question. Where a calculation is required, you should show your working; credit may be given for a correct method even if the final answer is incorrect. Where a question asks for a *named* example, marks are reserved for the use of a specific, real example.

Mark allocation

Section A (questions 1–3), all questions	[25 marks]
Section B (questions 4–7), two questions only, 20 marks each	[40 marks]
Total	**[65 marks]**

Command terms used in this paper

Identify / State	Give a brief answer; no explanation or supporting argument required.
Calculate	Obtain a numerical answer, showing the relevant working.
Describe	Give a detailed account of a pattern, trend or process.
Outline	Give a brief account or summary, with a little supporting detail.
Explain	Give a detailed account, including reasons or causes.
Evaluate	Make an appraisal by weighing up strengths and limitations.
Discuss	Offer a considered and balanced review including a range of arguments.
To what extent	Consider the merits or otherwise of an argument or concept.

All questions in this paper are original items written for revision purposes. They follow the style, structure and topic coverage of the Diploma Programme environmental systems and societies guide but are not reproduced from any past examination paper. All data presented in the figures are realistic but illustrative, and have been constructed for this mock examination.

Section A

*Answer **all** questions. Answers must be written within the answer boxes provided.*

Figure 1(a): Municipal solid waste generated per person per day, by income group

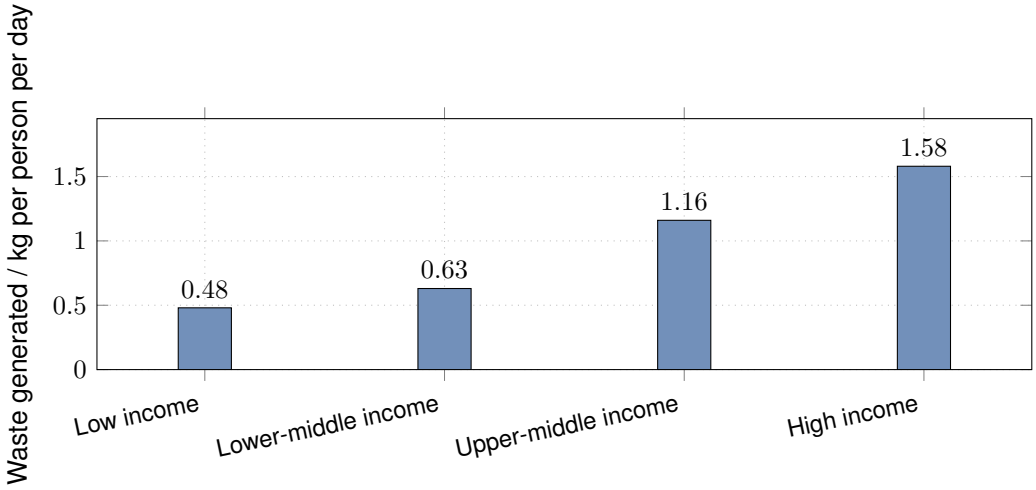
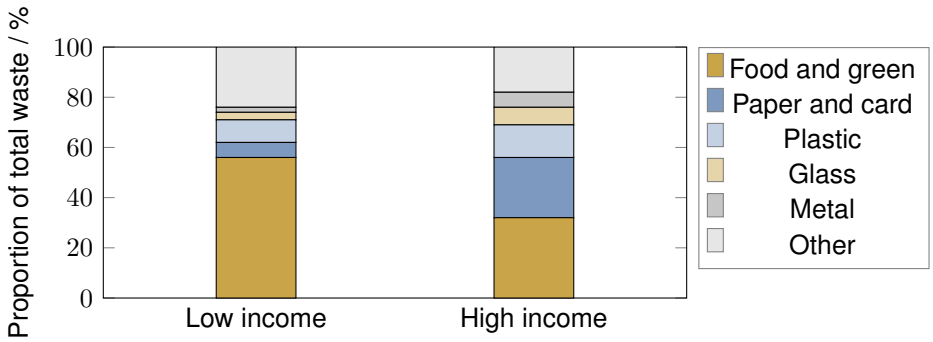


Figure 1(b): Composition of municipal solid waste in a low-income and a high-income country



1. (a) Using **Figure 1(a)**, state the mass of waste generated per person per day in high-income countries. **[1]**

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(b) Using **Figure 1(a)** and **Figure 1(b)**, describe how both the quantity and the composition of municipal solid waste change as national income increases. **[3]**

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(This question continues on the following page)

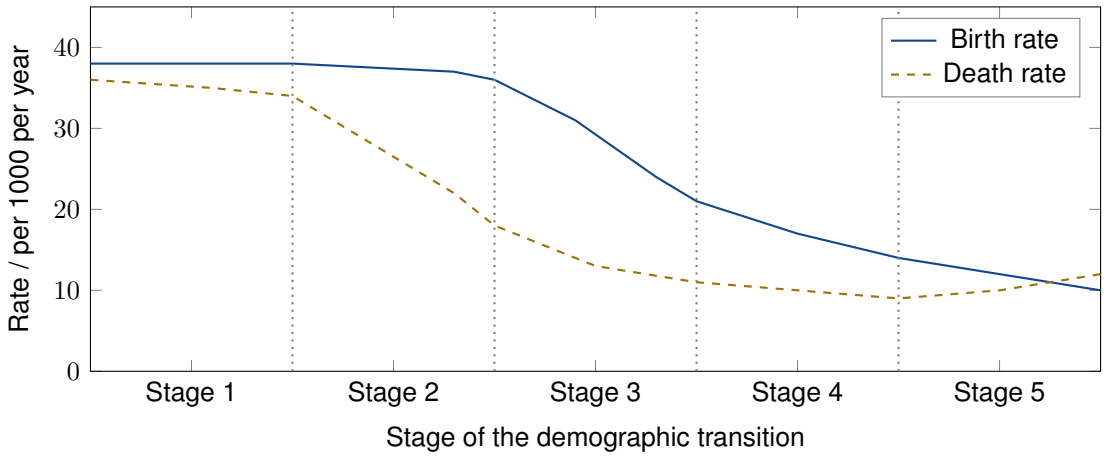
(Question 1 continued)

(c) Calculate the total mass of municipal solid waste, in tonnes, generated in one year by a high-income city with a population of 2.0 million people. Show your working. (1 tonne = 1000 kg) **[2]**

(d) Outline **one** reason why food waste makes up a larger proportion of municipal solid waste in low-income countries than in high-income countries. **[1]**

(e) Explain **two** environmental problems caused by the disposal of solid domestic waste in landfill. **[2]**

Figure 2: The demographic transition model



2. (a) Using **Figure 2**, identify the stage in which the death rate falls most rapidly. **[1]**

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(b) Using **Figure 2**, describe the change in birth rate from Stage 3 to Stage 5. **[2]**

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(c) A country has a crude birth rate of 32 per 1000 per year and a crude death rate of 8 per 1000 per year. Calculate the natural increase rate of this country, as a percentage. Show your working. **[2]**

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(d) Outline **one** limitation of using the demographic transition model to predict the future population of a country. **[1]**

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(e) Explain how improvements in the status and education of women can affect the rate of population growth. **[3]**

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Figure 3: Annual freshwater withdrawal in four countries

Country	Total withdrawal / km^3 yr^{-1}	Share of withdrawal by sector / %			Withdrawal as % of renewable resources
		Agriculture	Industry	Domestic	
P	610	90	5	5	68
Q	480	39	46	15	20
R	58	74	11	15	118
S	12	22	40	38	6

3. (a) Using **Figure 3**, calculate the volume of water withdrawn for agriculture each year in Country P, in km^3. **[1]**

(b) Using **Figure 3**, identify the country most likely to be using its water resources unsustainably and outline **one** reason for your choice. **[2]**

(c) Evaluate **one** strategy that could be used to reduce the demand for water in agriculture. **[4]**

Section B

*Answer **two** questions. Answers must be written within the answer boxes provided.*

4. (a) Outline **four** differences between the characteristics of r-strategist and K-strategist species. **[4]**

(b) Explain how human activities have altered the flows and storages of the carbon cycle. **[7]**

(c) To what extent is the concept of maximum sustainable yield useful in the management of natural resources? **[9]**

5. (a) Outline **two** advantages and **two** disadvantages of intensive commercial food production compared with subsistence farming. **[4]**

(b) Explain how soil is formed and how its properties influence its suitability for agriculture. **[7]**

(c) "Reducing food waste is a more effective way of feeding a growing population than increasing crop yields." Discuss this statement. **[9]**

6. (a) Outline **four** factors that affect the rate of growth of a human population. **[4]**

(b) Explain how urbanization changes the flows and storages of water within a drainage basin. **[7]**

(c) To what extent can the continued growth of urban areas be made sustainable? **[9]**

7. (a) Outline **two** point sources and **two** non-point sources of air pollution. **[4]**

(b) Explain how acid deposition is formed and the effects it has on ecosystems. **[7]**

(c) With reference to **named** examples, evaluate the strategies that have been used to reduce the impacts of acid deposition. **[9]**

Answer sheet for Section B

Question numbers answered: .....

End of examination

Total: 65 marks