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Diploma Programme
Programme du diplôme
Programa del Diploma

Environmental systems and societies
Standard level
Paper 2

Tuesday 21 May 2019 (morning)

Candidate session number

2 hours

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed 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]**.

24 pages

2219 – 6303

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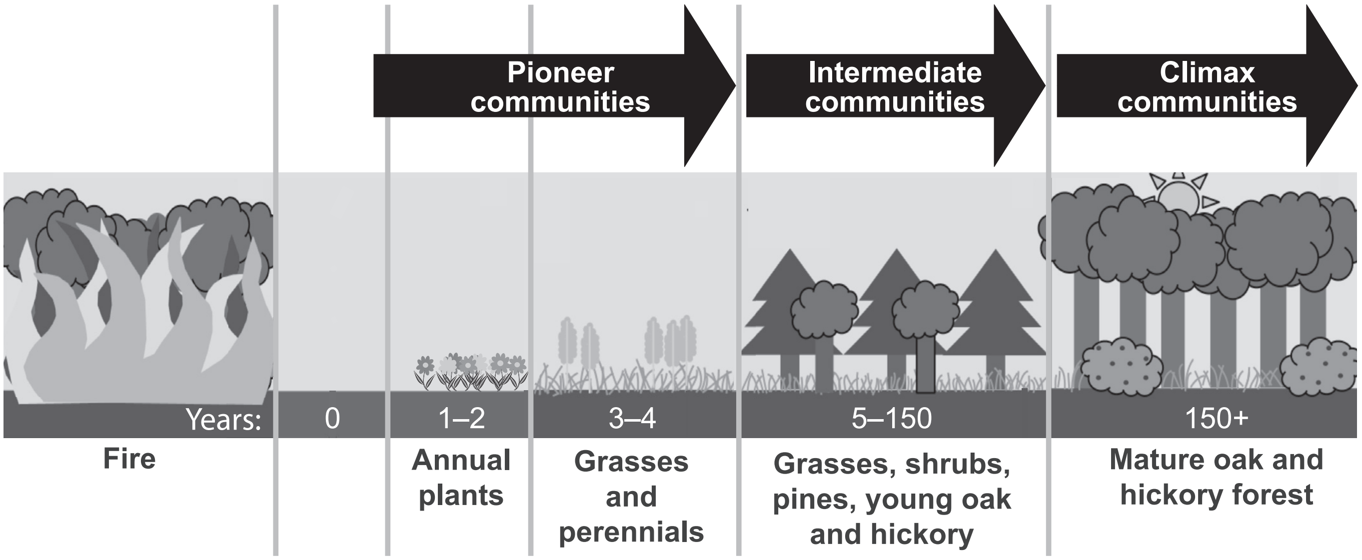
Section A

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

Figure 1: Stages of succession following disturbance by fire



[Source: adapted from Katelyn Murphy/Wikimedia file licensed under CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0/)]

1. (a) Outline **two** reasons why the species within pioneer communities in **Figure 1** are more likely to be *r*-strategists than *K*-strategists. [2]

(b) Outline **two** reasons why the climax community in **Figure 1** is more stable than the intermediate community. [2]

(This question continues on the following page)

(Question 1 continued)

(c) Distinguish between zonation and succession. [1]

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(d) Outline **two** ways in which the food web is likely to change as a result of succession. [2]

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(e) Outline **two** ways in which the soil quality in the pioneer stages of the succession model shown in **Figure 1** will differ from that in the climax ecosystem. [2]

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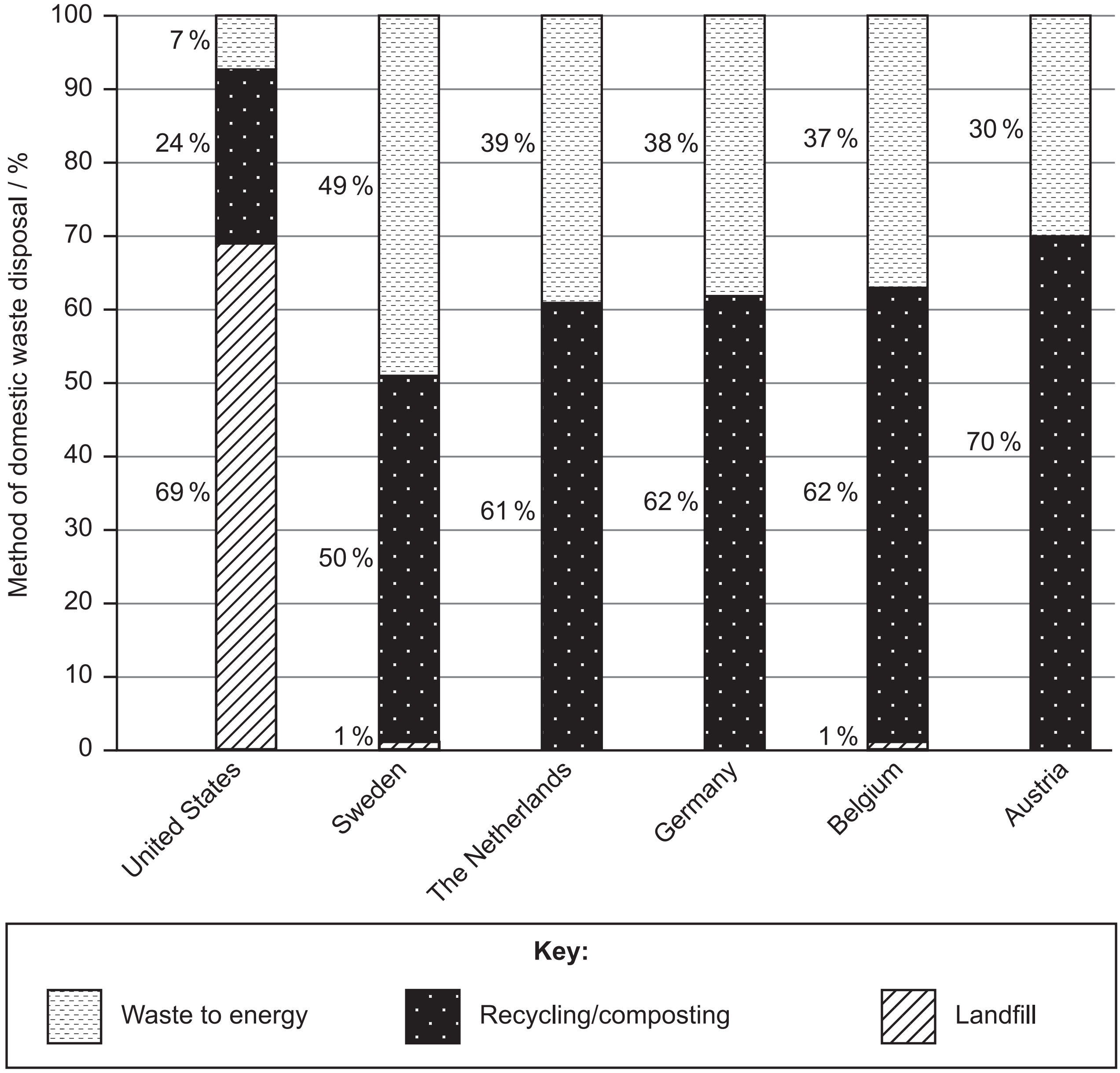
Figure 2: Methods of domestic waste disposal for selected countries



[Source: adapted from https://ensia.com]

2. (a) With reference to **Figure 2**, state the country that has the highest level of recycling/composting. [1]

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(This question continues on the following page)

(Question 2 continued)

(b) Outline **two** possible reasons for greater use of landfills in the United States compared with the European countries shown in **Figure 2**. [2]

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(c) Outline **two** strategies for reducing the environmental impact of landfill sites. [2]

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(d) Identify **two** problems associated with **one** of the waste disposal choices of Germany. [2]

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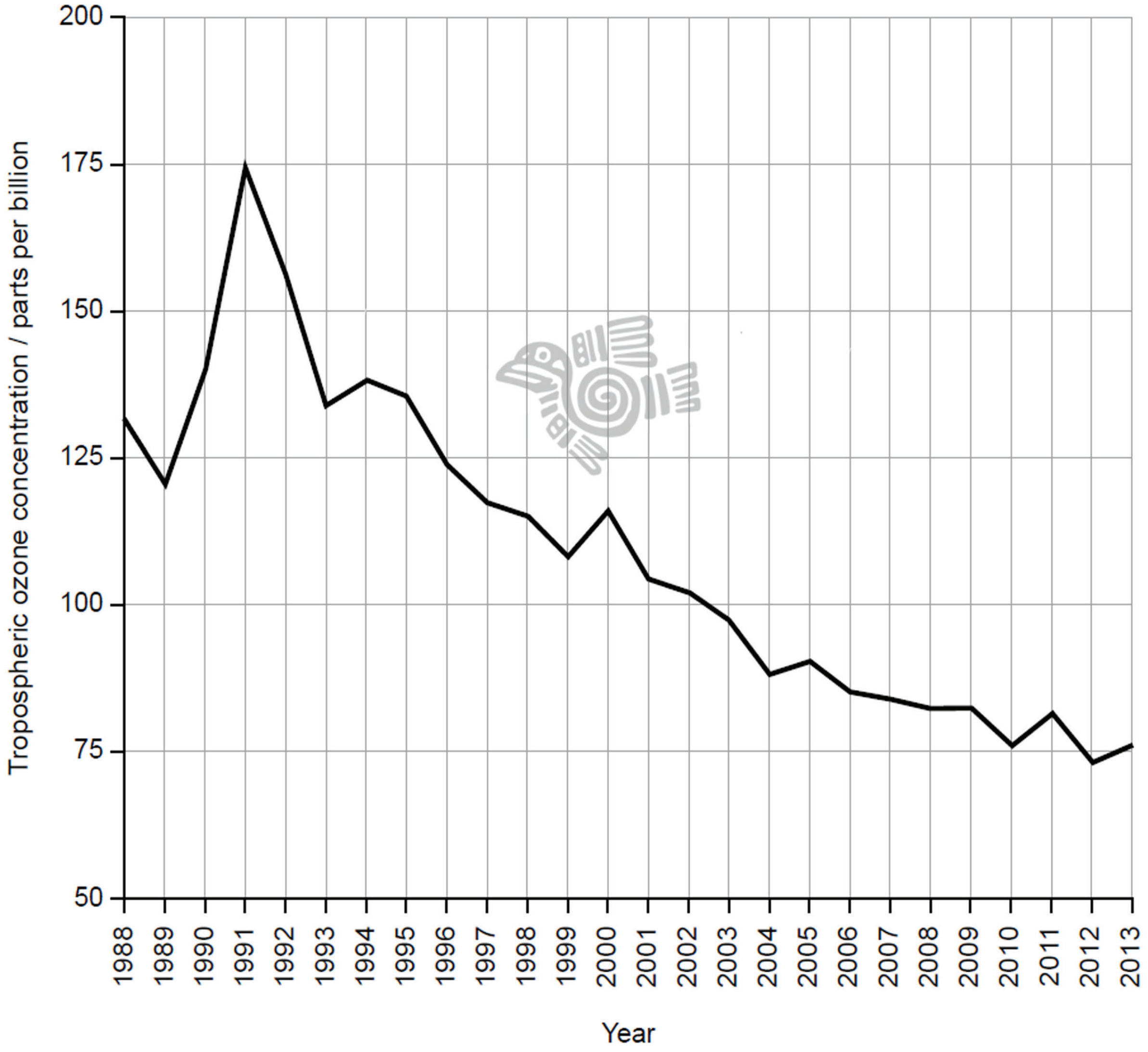
Figure 3: Tropospheric ozone levels in Mexico City



[Source: http://www.aire.cdmx.gob.mx/default.php?opc=%27aqBhnmOkZA==%27]

3. (a) With reference to **Figure 3**, calculate the difference between the highest concentration and lowest concentration of tropospheric ozone. [1]

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(This question continues on the following page)

(Question 3 continued)

(b) State **two** factors necessary for the chemical formation of ozone in the troposphere. [2]

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(c) Outline why a high concentration of ozone in the troposphere is a direct problem for humans, while in the stratosphere it is a benefit to humans. [2]

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(d) Suggest possible reasons for the overall trends of tropospheric ozone levels in **Figure 3**. [4]

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Section B

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

4. (a) With reference to processes occurring within the atmospheric system:

(i) Identify **two** transformations of matter. [2]

(ii) Identify **two** transfers of energy. [2]

(b) Explain how regional differences in the hydrological cycle influence the formation of different biomes. [7]

(c) Climate can both influence, and be influenced by, terrestrial food production systems.

To what extent can terrestrial food production strategies contribute to a sustainable equilibrium in this relationship? [9]

5. (a) Identify **four** impacts on an ecosystem that may result from the introduction of an invasive species of herbivore. [4]

(b) Explain how both positive and negative feedback mechanisms may play a role in producing a typical S population growth curve for a species. [7]

(c) Technocentrists may support the belief that technological development has always been able to overcome limits to human population growth.

To what extent do the patterns of growth and development in human populations, as demonstrated in the Demographic Transition Model, support this claim? [9]

6. (a) Identify **four** strategies for limiting the impact of burning fossil fuels without reducing their use. [4]

(b) Suggest a range of practical procedures that could be carried out to measure the abiotic and biotic impacts of an oil spill in an aquatic ecosystem. [7]

(c) Even though there is growing global support for ecocentric values, the global consumption of fossil fuels continues to rise each year.

With reference to energy choices in named countries, discuss possible reasons for this situation occurring. [9]

7. (a) Identify **four** factors that make the estimation of carrying capacity more problematic for human populations than for most other species. [4]

(b) Explain why the ecological footprint of two populations consuming the same quantity of food and energy may be different. [7]

(c) Discuss the potential for designing a protected forest area that allows for the harvesting of natural resources while at the same time conserving its biodiversity. [9]

Turn over