



No part of this product may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without written permission from the IB.

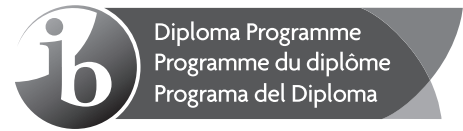
Additionally, the license tied with this product prohibits commercial use of any selected files or extracts from this product. Use by third parties, including but not limited to publishers, private teachers, tutoring or study services, preparatory schools, vendors operating curriculum mapping services or teacher resource digital platforms and app developers, is not permitted and is subject to the IB's prior written consent via a license. More information on how to request a license can be obtained from <http://www.ibo.org/contact-the-ib/media-inquiries/for-publishers/guidance-for-third-party-publishers-and-providers/how-to-apply-for-a-license>.

Aucune partie de ce produit ne peut être reproduite sous quelque forme ni par quelque moyen que ce soit, électronique ou mécanique, y compris des systèmes de stockage et de récupération d'informations, sans l'autorisation écrite de l'IB.

De plus, la licence associée à ce produit interdit toute utilisation commerciale de tout fichier ou extrait sélectionné dans ce produit. L'utilisation par des tiers, y compris, sans toutefois s'y limiter, des éditeurs, des professeurs particuliers, des services de tutorat ou d'aide aux études, des établissements de préparation à l'enseignement supérieur, des fournisseurs de services de planification des programmes d'études, des gestionnaires de plateformes pédagogiques en ligne, et des développeurs d'applications, n'est pas autorisée et est soumise au consentement écrit préalable de l'IB par l'intermédiaire d'une licence. Pour plus d'informations sur la procédure à suivre pour demander une licence, rendez-vous à l'adresse <http://www.ibo.org/fr/contact-the-ib/media-inquiries/for-publishers/guidance-for-third-party-publishers-and-providers/how-to-apply-for-a-license>.

No se podrá reproducir ninguna parte de este producto de ninguna forma ni por ningún medio electrónico o mecánico, incluidos los sistemas de almacenamiento y recuperación de información, sin que medie la autorización escrita del IB.

Además, la licencia vinculada a este producto prohíbe el uso con fines comerciales de todo archivo o fragmento seleccionado de este producto. El uso por parte de terceros —lo que incluye, a título enunciativo, editoriales, profesores particulares, servicios de apoyo académico o ayuda para el estudio, colegios preparatorios, desarrolladores de aplicaciones y entidades que presten servicios de planificación curricular u ofrezcan recursos para docentes mediante plataformas digitales— no está permitido y estará sujeto al otorgamiento previo de una licencia escrita por parte del IB. En este enlace encontrará más información sobre cómo solicitar una licencia: <http://www.ibo.org/es/contact-the-ib/media-inquiries/for-publishers/guidance-for-third-party-publishers-and-providers/how-to-apply-for-a-license>.



Environmental systems and societies
Standard level
Paper 2

Tuesday 21 May 2019 (morning)

Candidate session number

2 hours

--	--	--	--	--	--	--	--	--	--

Instructions to candidates

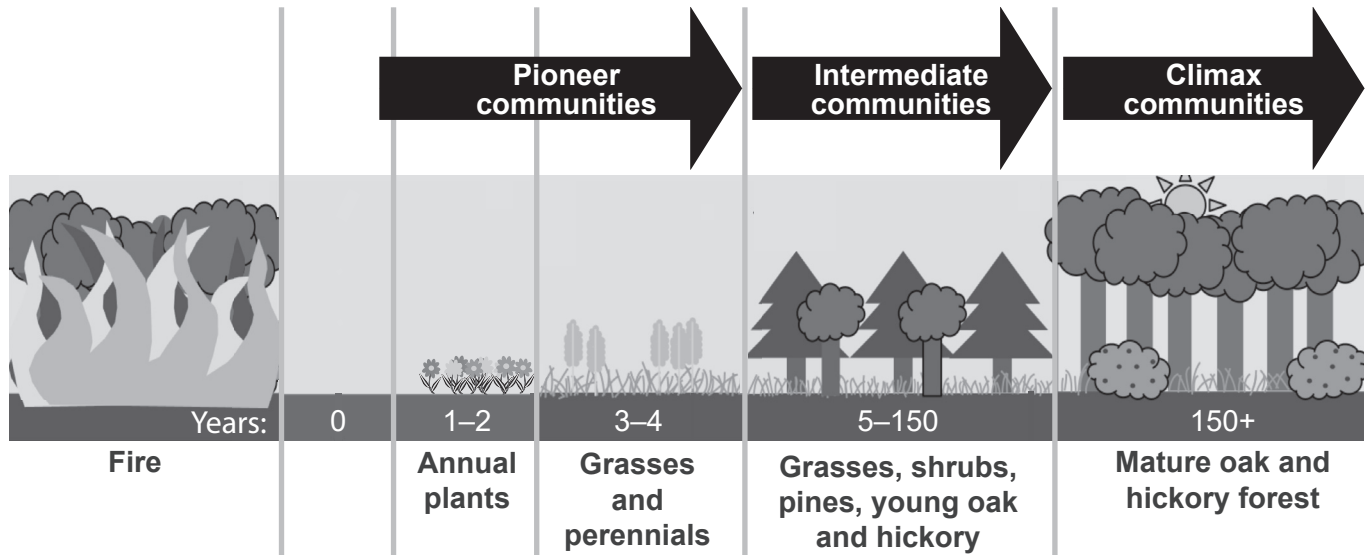
- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer two questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark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



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]

.....
.....

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

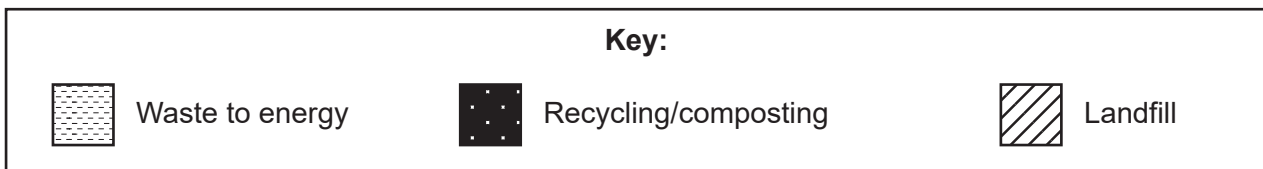
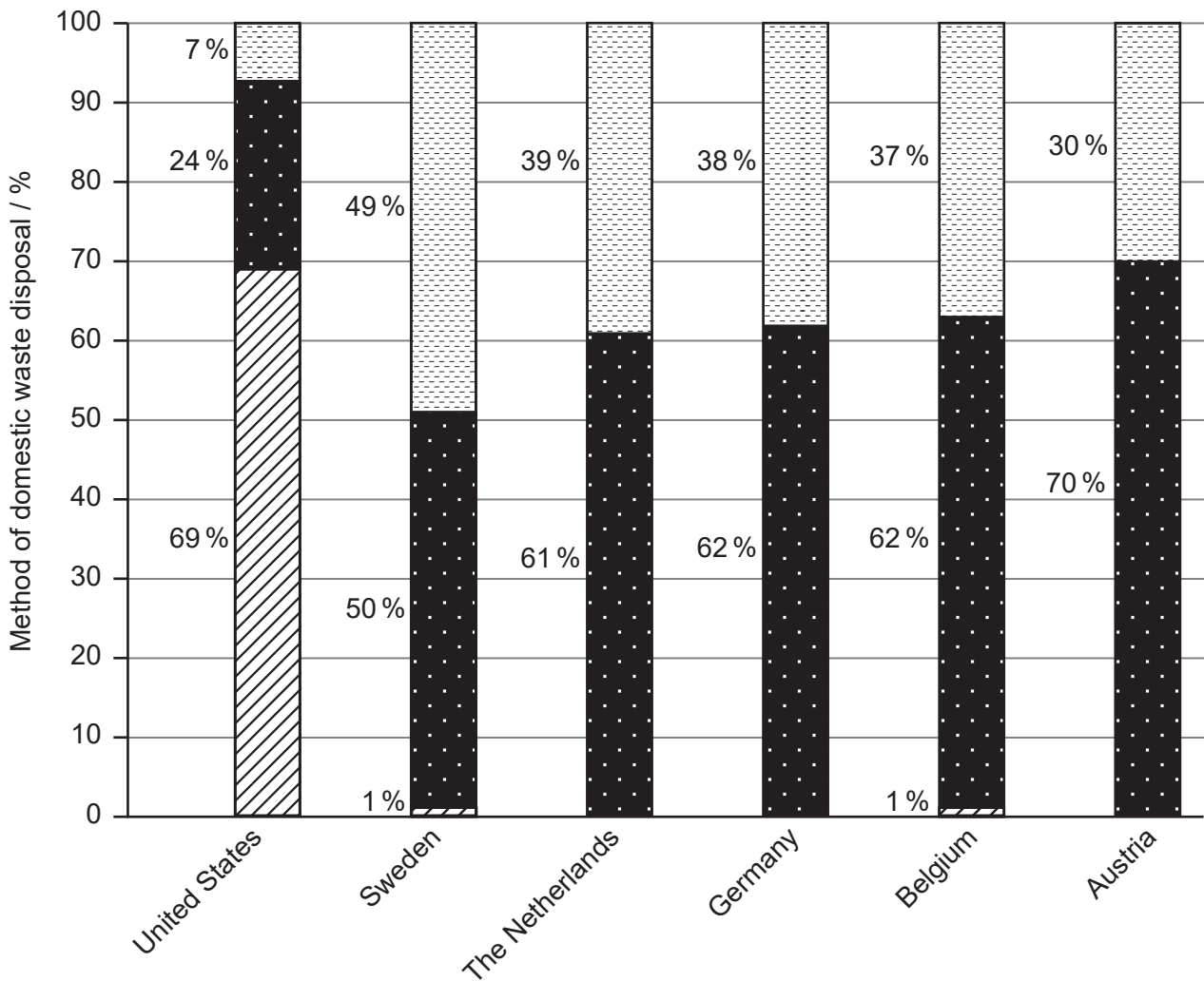
.....
.....
.....
.....

(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]

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



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]

.....

.....

(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]

.....

.....

.....

.....

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

.....

.....

.....

.....

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

.....

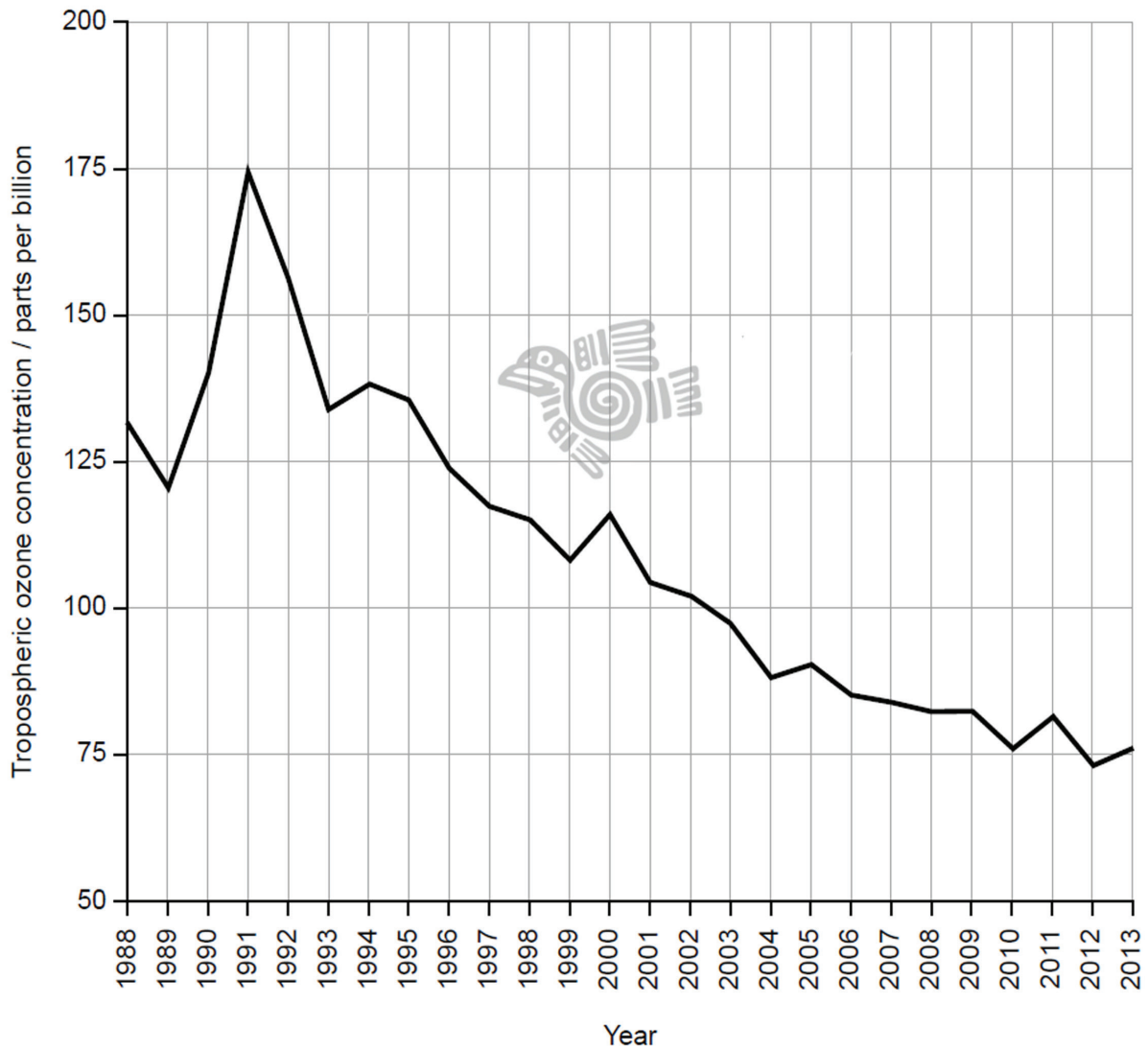
.....

.....

.....



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]

.....

.....

(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]

.....

.....

.....

.....

(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]

.....

.....

.....

.....

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



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]



A large rectangular area containing 30 horizontal dotted lines for writing.



A large rectangular area containing horizontal dotted lines for writing.



24EP11

Turn over

A large rectangular area containing horizontal dotted lines for writing.



A large rectangular area containing horizontal dotted lines for writing.



24EP13

Turn over

A large rectangular area containing horizontal dotted lines for writing.



A large rectangular area containing horizontal dotted lines for writing.



24EP15

Turn over

A large rectangular area containing 30 horizontal dotted lines for writing.



A large rectangular area containing horizontal dotted lines for writing.



24EP17

Turn over

A large rectangular area containing horizontal dotted lines for writing.



A large rectangular area containing 25 horizontal dotted lines, intended for writing.



24EP19

Turn over

A large rectangular area containing horizontal dotted lines for writing.



24EP20

Large rectangular area with horizontal dotted lines for writing.



24EP21

Turn over

A large rectangular area with a dotted line pattern, intended for writing answers.



A large rectangular area containing horizontal dotted lines for writing.



24EP23

Turn over

A large rectangular box containing 30 horizontal dotted lines for writing.

