

Environmental Systems SL P1

2007 May

School Level 12th IB Diploma

Programme

Board Exam

International Baccalaureate (IB

Board)

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**ENVIRONMENTAL SYSTEMS  
STANDARD LEVEL  
PAPER 1**

Monday 14 May 2007 (afternoon)

45 minutes

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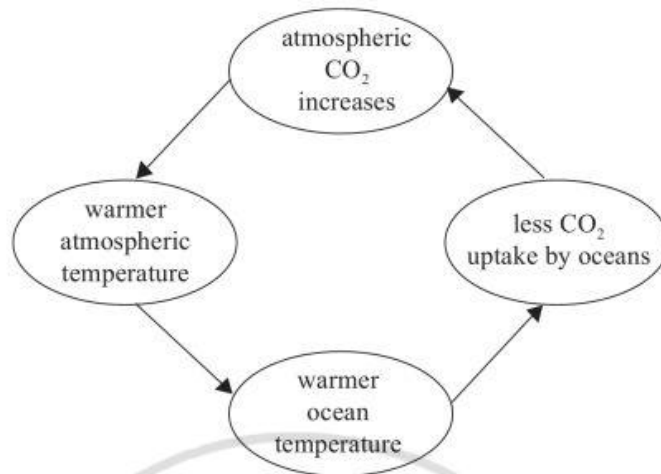
**INSTRUCTIONS TO CANDIDATES**

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.



1. Which of the following is the best definition of a system?
  - A. An assemblage of parts in which there are no changes over time
  - B. A set of biological components and their physical interactions
  - C. A set of components that function in an independent manner
  - D. An assemblage of parts, and their relationships, forming a whole
  
2. Which of the following descriptions best represents a closed system?
  - A. It exchanges energy but not matter.
  - B. It exchanges neither matter nor energy.
  - C. It exchanges matter but not energy.
  - D. It exchanges matter and energy.
  
3. Which statement best describes the second law of thermodynamics?
  - A. In all ecosystems, energy is neither created nor destroyed, but it may be converted from one form to another.
  - B. Energy cannot leave a system.
  - C. The entropy of a system always remains constant for a spontaneous process.
  - D. In any isolated system entropy tends to increase spontaneously.

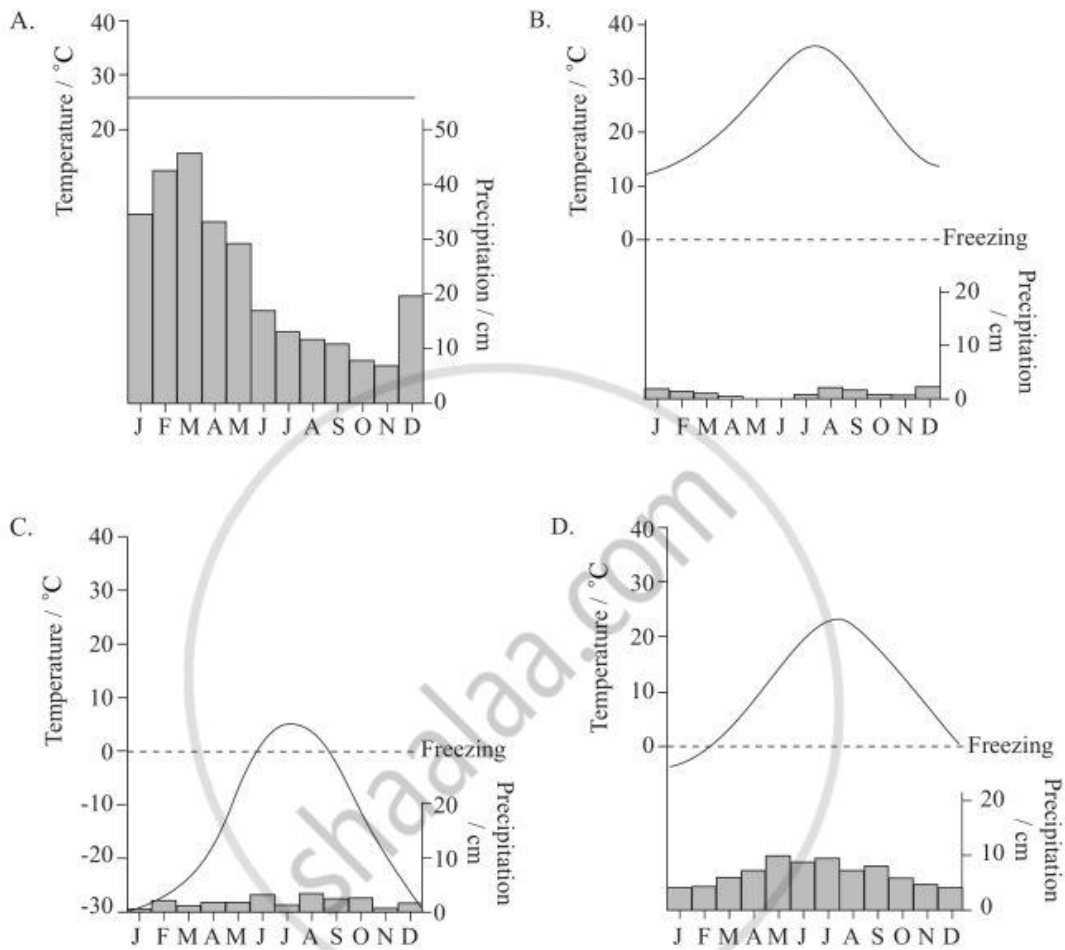
4.



The diagram above is an example of

- A. steady state equilibrium.
  - B. positive feedback.
  - C. negative feedback.
  - D. static equilibrium.
5. A collection of ecosystems sharing similar climatic conditions is a
- A. niche.
  - B. community.
  - C. habitat.
  - D. biome.

6. The graphs below summarize the average temperature and precipitation of different regions. Which figure best represents the climate where a temperate forest may be found?

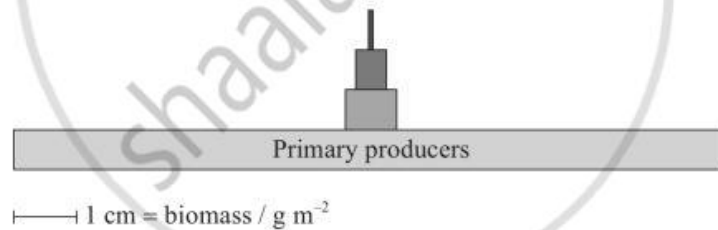


7. Which of the following is a list of abiotic factors that affect the distribution of organisms?

- A. Sunlight, decomposers and soil pH
- B. Temperature, sunlight and soil pH
- C. Water, sunlight and competition
- D. Disease, pH and dissolved oxygen

8. Spiders mainly use a web and poisonous fangs to trap and eat insects such as flies. What type of interaction is this?
- A. Parasitism
  - B. Competition
  - C. Mutualism
  - D. Predation
9. Which of the following includes **only** essential requirements for photosynthesis?
- A. Sunlight, carbon dioxide and oxygen
  - B. Water, nitrates and oxygen
  - C. Carbon dioxide, water and sunlight
  - D. Nitrates, water and sugars

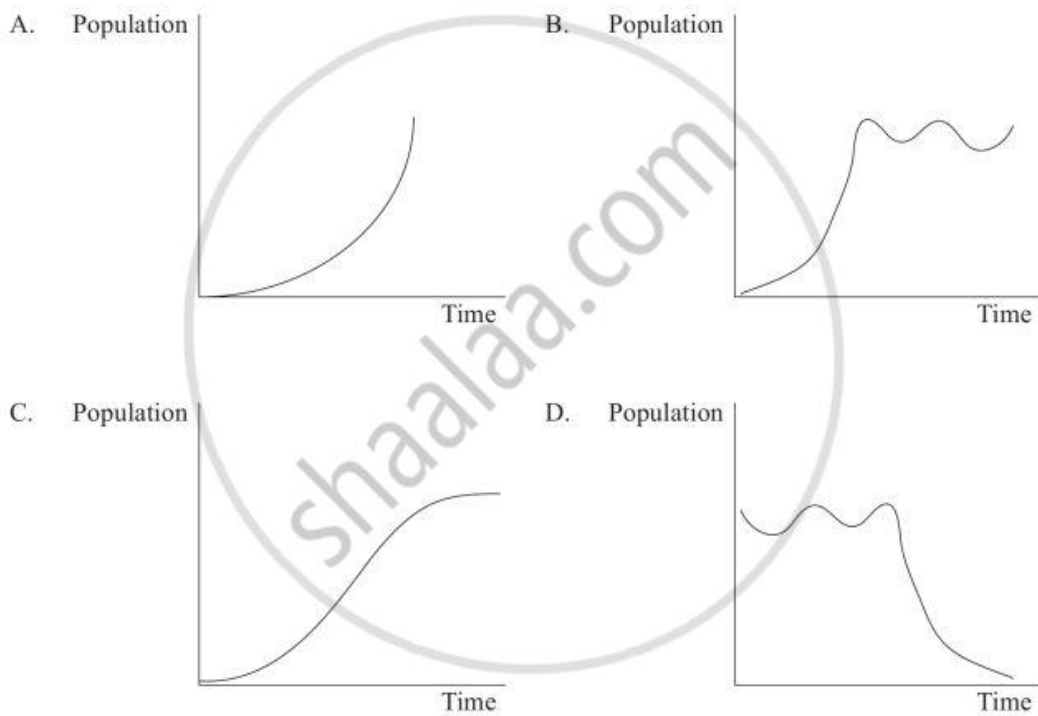
10.



- Which of the following **cannot** be deduced from the figure above?
- A. The standing crop of secondary consumers
  - B. The trophic level with the lowest productivity
  - C. The number of trophic levels in the food chain
  - D. The natural capital of producers in terms of biomass

11. The total quantity of organic matter produced by photosynthesis per unit area per unit time is the
- A. gross primary productivity.
  - B. net primary productivity.
  - C. secondary productivity.
  - D. dry biomass.

12. Which of the following graphs represents a "J population growth curve"?



13. In the list below, how can the role of lichen be best described?

rock → lichen → moss → grass → shrub → trees → oak hickory forest

- A. A part of the second trophic level  
 B. A part of a pioneer community  
 C. A part of the decomposer community  
 D. A part of a climax community
14. Which of the following pairs is correct for pioneer and climax communities?

	<b>Pioneer community</b>	<b>Climax community</b>
A.	Biomass stable	Biomass increasing
B.	High biotic storage of nutrients	High abiotic storage of nutrients
C.	Favourable environment	Harsh environment
D.	Low species diversity	High species diversity

15. Which of the following statements is **incorrect**?

- A. Density-dependent factors lead to the stability of populations.  
 B. Weather is an example of a density-independent factor.  
 C. Density-dependent factors are usually abiotic.  
 D. Density-dependent factors change in proportion to population density.



16. Which of the following explains why over 50% of the air in the atmosphere is found within 5 km of the Earth's surface?
- A. A decrease in the atmospheric temperature with altitude
  - B. Air pressure
  - C. Gravitational forces
  - D. Presence of the ozone layer
17. Heat from the Earth's surface is released into the atmosphere as both sensible and latent heat. Which of the following statements about these two forms of heat is correct?
- A. Latent heat increases the air temperature during cloud formation.
  - B. Sensible heat is always radiated out to space without increasing the air temperature.
  - C. Sensible heat is transferred in the form of water vapour.
  - D. More latent heat is lost from the Earth's surface in cooler conditions.
18. Which of the following pairs of statements about ozone is correct?

	<b>Tropospheric ozone</b>	<b>Stratospheric ozone</b>
A.	It is significantly affected by increasing levels of CFCs	It accumulates in high concentration to form the ozone layer
B.	It causes health problems in humans and animals	It is significantly affected by increasing levels of CFCs
C.	It accumulates in high concentration to form the ozone layer	It damages photosynthetic organisms
D.	It damages photosynthetic organisms	It causes health problems in humans and animals

19. Which of the following greenhouse gases are produced **only** by human activities?

- A. Methane
- B. Nitrogen oxides
- C. Water vapour and carbon dioxide
- D. Chlorofluorocarbons (CFCs)

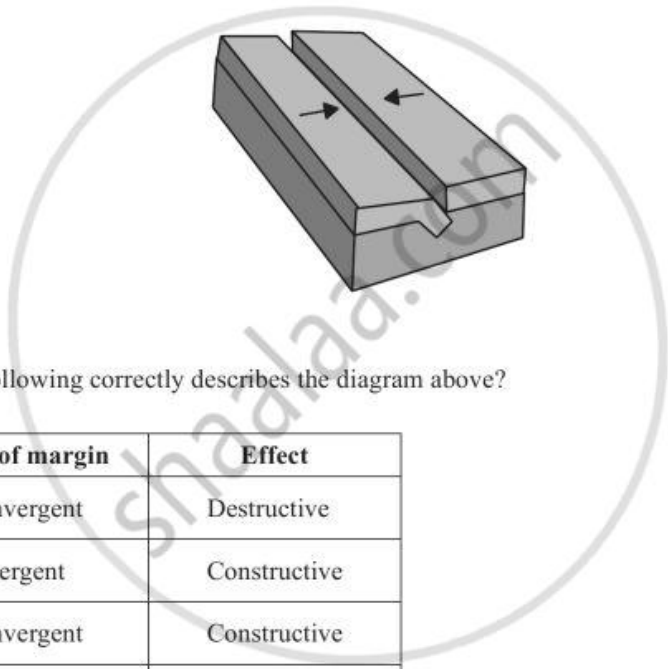
20. Which of these measures would reduce the quantity of acid rain produced?

- I. Removing  $\text{SO}_2$  from smokestacks
  - II. Switching to renewable energy
  - III. Using lime to neutralize acidified lakes
  - IV. Replacing coal with natural gas as energy source
- A. I, II and IV only
  - B. II and IV only
  - C. I, II and III only
  - D. I, III and IV only

21. Which of the following **only** includes factors that affect ocean currents?

- A. Winds, precipitation and solar heating
- B. Marine biological productivity, air pressure and the Earth's rotation
- C. Solar heating, winds and gravitational forces
- D. The Earth's rotation, precipitation and marine biological productivity

22. Which of the following statements about the El Niño phenomenon is **incorrect**?
- A. El Niño leads to a decrease in marine productivity in the western Pacific.
  - B. El Niño is a disruption of the ocean-atmosphere system in the tropical Pacific.
  - C. Climatic changes resulting from El Niño affect many parts of the world.
  - D. The El Niño phenomenon results in redistribution of rains with flooding and droughts.
23. The diagram below represents the interaction between two tectonic plates.



Which of the following correctly describes the diagram above?

	Type of margin	Effect
A.	Convergent	Destructive
B.	Divergent	Constructive
C.	Convergent	Constructive
D.	Divergent	Destructive

24. Which of the following statements about soils is **correct**?
- A. The time taken for a mature soil to develop depends only on abiotic factors associated with weathering.
  - B. The distribution of world soil types is independent of patterns of climate and vegetation.
  - C. Micro-organisms, such as bacteria and fungi, play an important role in the formation of soil.
  - D. The rate of soil formation is such that it can be considered a renewable resource.
25. Which of the following is most likely to lead to desertification?
- A. Eutrophication
  - B. Use of organic fertilizers
  - C. Irrigation
  - D. Ozone depletion
26. A particular resource depends on the energy of the sun but not on living processes. Which of the following could represent that resource and the correct class to which it belongs?

	<b>Resource</b>	<b>Class of resource</b>
A.	Fossil fuel	Replenishable
B.	Fossil fuel	Non-renewable
C.	Groundwater	Replenishable
D.	Groundwater	Non-renewable

27. A country has a crude birth rate of 19 per thousand and a rate of increase of 0.1%. What is the crude death rate per thousand?
- A. 18.9
  - B. 18.0
  - C. 19.1
  - D. 20.0
28. If the harvesting of a fish population were to exceed the sustainable yield in one year, this would mean
- A. the natural capital had been reduced but the natural income had increased.
  - B. the natural capital remained the same but the natural income had been reduced.
  - C. the natural capital had been reduced and the natural income would be reduced in the following year.
  - D. the natural capital remained the same but the natural income would be reduced in the following year.
29. The human carrying capacity of a country
- A. can never be exceeded.
  - B. is difficult to calculate because resources can be traded internationally.
  - C. is achieved when birth rates exceed death rates.
  - D. is difficult to calculate because humans are omnivorous.

30. Which of the following statements is **incorrect**?
- A. The decline in fertility rate is mainly due to improvements in family planning and education.
  - B. Due to improvements in medical care, death rates have declined and life expectancy has increased.
  - C. Fertility rates in developing countries tend to be low.
  - D. Throughout history the world population has grown continuously.
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