



**ENVIRONMENTAL SYSTEMS
STANDARD LEVEL
PAPER 1**

Thursday 16 November 2006 (afternoon)

45 minutes

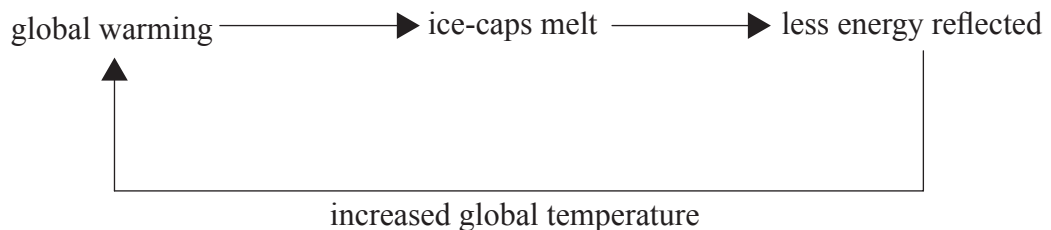
INSTRUCTIONS TO CANDIDATES

- 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. What is the name given to a group of organisms that can interbreed and produce fertile offspring?
 - A. Ecosystem
 - B. Species
 - C. Community
 - D. Niche

2. Which of the following determines the trophic level of an organism?
 - A. The position of the organism in a food chain
 - B. The number of organisms present in a food chain
 - C. The number of different species present in a food web
 - D. The rate at which the organism converts solar energy into chemical energy

3. Of what is the diagram below an example?



- A. Negative feedback
- B. Positive feedback
- C. Steady-state equilibrium
- D. Static equilibrium

4. Which row correctly gives examples of transfer and transformation processes?

	Transfer	Transformation
A.	Decomposition	Organic matter entering the ocean
B.	Evaporation	Decomposition
C.	Evaporation	Organic matter entering the ocean
D.	Organic matter entering the ocean	Evaporation

5. When animals eat other animals, they could be

- A. primary consumers.
- B. secondary consumers.
- C. producers.
- D. herbivores.

6. Which statement best illustrates the second law of thermodynamics?

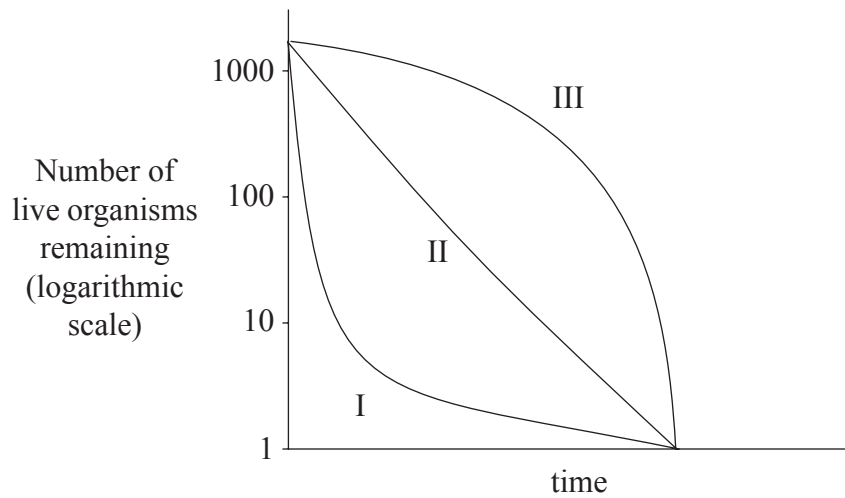
- A. When chemical energy such as food is converted into mechanical energy such as movement, much energy is lost as heat.
- B. Total energy inputs to the biosphere are equal to total energy outputs.
- C. Solar energy is converted into chemical energy in photosynthesis.
- D. Energy is neither created nor destroyed, but it may be converted from one form to another.

7. Which of the following is the best definition of a community?

- A. A group of organisms of the same species living in the same area at the same time and capable of interbreeding.
- B. The environment in which a species normally lives.
- C. A group of populations living and interacting with each other in a common habitat.
- D. A group of organisms that interbreed and produce fertile offspring.

8. Which process lowers the level of CO₂ in the atmosphere?
- A. Volcanic eruption
 - B. Combustion
 - C. Photosynthesis
 - D. Respiration
9. In an area of grassland, a sudden severe frost reduces the population of butterflies. Of what is this frost an example?
- A. A density-dependent factor
 - B. Biological competition
 - C. Predation
 - D. A density-independent factor
10. Which of the following is a typical characteristic of a *K*-strategist?
- A. Little or no parental care and protection of offspring
 - B. Low ability to compete
 - C. Reproduce late in life
 - D. Reproduce and disperse rapidly when conditions are favourable
11. Which is the main reservoir of nitrogen?
- A. The atmosphere
 - B. Forests
 - C. Ice-caps
 - D. Freshwater

12.



Lines I, II and III are survivorship curves for three different populations in an ecosystem. Which row best describes the nature of the three populations?

	<i>r</i> -strategists	<i>K</i> -strategists	intermediate strategists
A.	III	II	I
B.	I	III	II
C.	III	I	II
D.	I	II	III

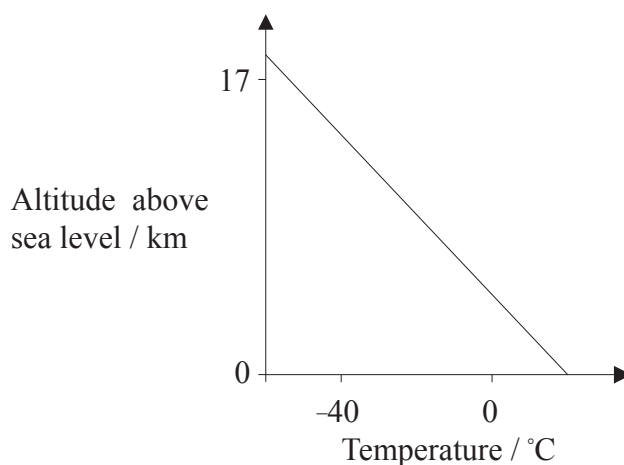
13. Which biome is usually found adjacent to ice-caps?

- A. Tundra
- B. Grassland
- C. Tropical rain forest
- D. Temperate forest

14. Which statement about productivity is correct?

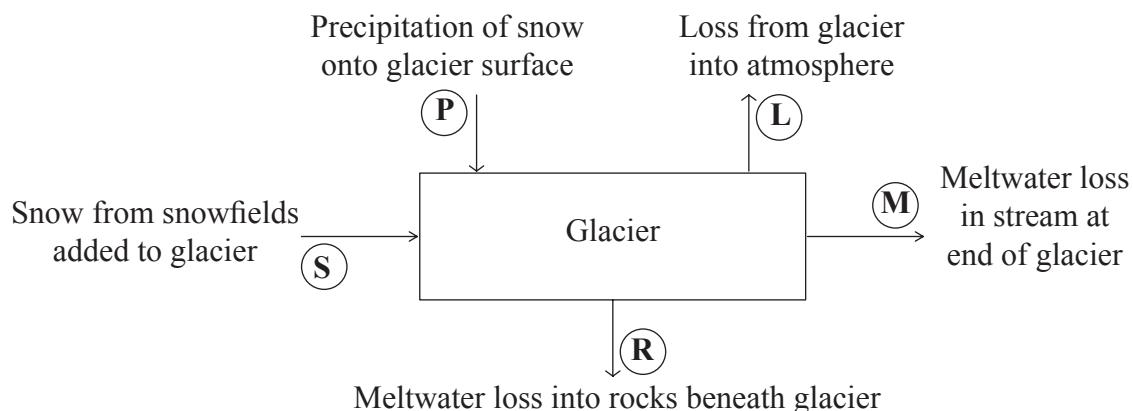
- A. Net primary productivity is measured as energy fixed per unit area.
- B. Net productivity is the gain in energy or biomass per unit time after allowing for respiration losses.
- C. Net productivity is equivalent to the total solar energy fixed by photosynthesis in green plants.
- D. Net productivity is the total biomass gained by heterotrophic organisms per unit time.

15. What does the graph below represent?



- A. The effect of the lapse rate
- B. The effect of temperature on the formation of photochemical smog
- C. The role of atmospheric circulation in the redistribution of heat
- D. The causes of the tricellular model

16. The flow diagram below shows the inputs and outputs from a valley glacier in a mountain region over a period of one year.



Assuming the total amount of ice in the glacier remains constant over the year, what is the value for **R**?

- A. $(P+S) - (L+M)$
- B. $S + P + M + L$
- C. $\frac{P+L}{S+M}$
- D. $(L+M) - (R \times S)$
17. Which row contains correct statements about ozone depletion and global warming?

	Ozone depletion is ...	Greenhouse effect is ...
A.	a necessary condition for life on Earth.	caused by ultraviolet radiation.
B.	caused by ultraviolet radiation.	caused by carbon dioxide, methane and CFCs.
C.	a cause of damage to photosynthetic organisms.	a cause of increases in the rate of skin cancer.
D.	caused by CFCs.	a necessary condition for life on Earth.

18. Which of the following has been most effective in reducing world emissions of CFCs?

- A. Improved technologies in the development of electric cars
- B. Aid programmes to developing countries
- C. Policies to minimize the combustion of fossil fuels
- D. International agreements, including the Montreal Protocol

19. What happens when sunlight interacts with pollutants in the lower atmosphere?

- A. Destruction of the ozone layer occurs
- B. Stratospheric ozone is produced
- C. Thermal inversion occurs
- D. Photochemical smog is produced

20. Which of the following are greenhouse gases?

- I. Water vapour
 - II. Carbon dioxide
 - III. Methane
- A. I and II only
 - B. II and III only
 - C. II only
 - D. I, II and III

21. Which statement about acid rain is correct?

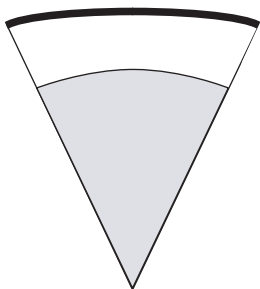
- A. Acid rain is a problem of developed countries because it is always deposited onto industrial areas.
- B. Rain with pH above 7 is considered to be acid rain.
- C. Lime can be used to restore acidified lakes.
- D. Corrosion of buildings and rising sea levels are two of the main effects of acid rain.

22. Why are oceans considered an important factor in the regulation of climate?

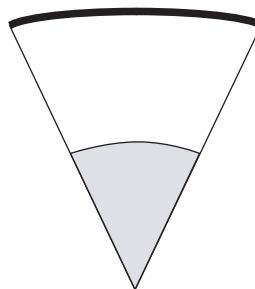
- A. Land and water absorb and release heat at different rates
- B. The Earth's axis is tilted and as a result the oceans receive higher insolation
- C. Cloud cover and evaporation are lower in the ocean
- D. The prevailing surface winds are stronger over the oceans than over land

23. The diagrams below represent the internal structure of the Earth. Which diagram most closely shows the zones in the correct proportions?

A.



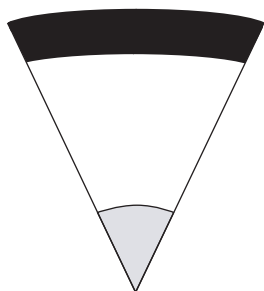
B.



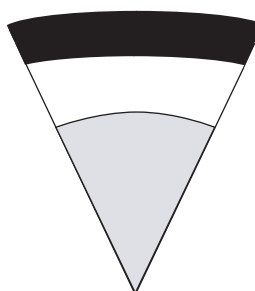
Key:

- Crust
- Mantle
- Core

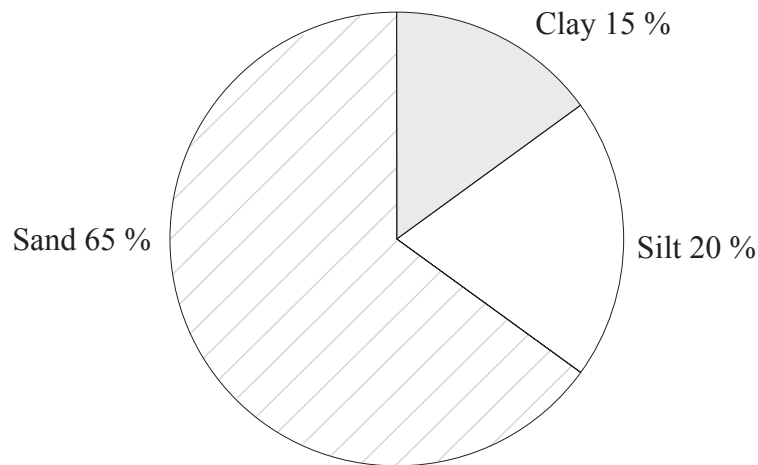
C.



D.



24. The figure below shows the composition of a typical sandy soil.



Which statement is correct?

- A. It is a well-drained and aerated soil
 - B. It has high levels of humus
 - C. It holds large amounts of water
 - D. It is likely to be a rich, fertile soil
25. Which data are needed to calculate the natural increase rate of a population?
- I. Crude birth rate
 - II. Crude death rate
 - III. Immigration
 - IV. Sex ratio
- A. I and II only
 - B. I, II and IV only
 - C. II, III and IV only
 - D. I, II, III and IV

26. What term is used to describe non-living natural resources that depend directly on the sun's energy?
- A. Non-renewable natural capital
 - B. Renewable natural capital
 - C. Biotic natural capital
 - D. Replenishable natural capital
27. Which of the following could **not** influence the carrying capacity for a deer population on a small island?
- A. Total area
 - B. Primary productivity
 - C. Presence of competing herbivores
 - D. Rate of reproduction
28. Which of the following is a stable community of organisms produced as a result of ecological succession?
- A. A degraded community
 - B. A climax community
 - C. A transitional community
 - D. A pioneer community
29. Which list contains only abiotic factors in a marine environment?
- A. algae, temperature and nitrogen level
 - B. salinity, turbidity and plankton
 - C. decomposers, carbon dioxide and calcium level
 - D. pH, dissolved oxygen and light intensity

30. Which statement is correct?

- A. Only resources that have a commercial value are considered to be natural capital.
 - B. Nuclear power is a replenishable natural resource.
 - C. Natural capital is a resource that can always produce an income.
 - D. A catch of tuna fish is a form of natural income.
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