N08/4/ENVSY/SPM/ENG/TZ0/XX+

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ENVIRONMENTAL SYSTEMS
STANDARD LEVEL
PAPER 1

Monday 17 November 2008 (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. Which of the following statements about systems is correct?

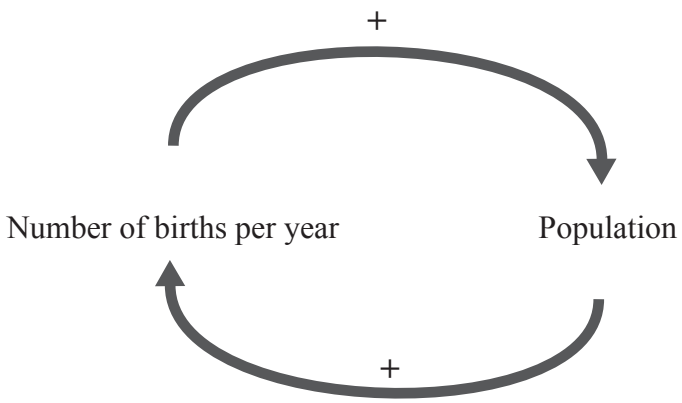
A. Islands are examples of closed systems.

B. An ecosystem is an example of an open system because it exchanges energy but not matter with its surroundings.

C. Isolated systems do not occur naturally on Earth.

D. A closed system exchanges neither matter nor energy with its surroundings.

2. Which of the following does the diagram below represent?



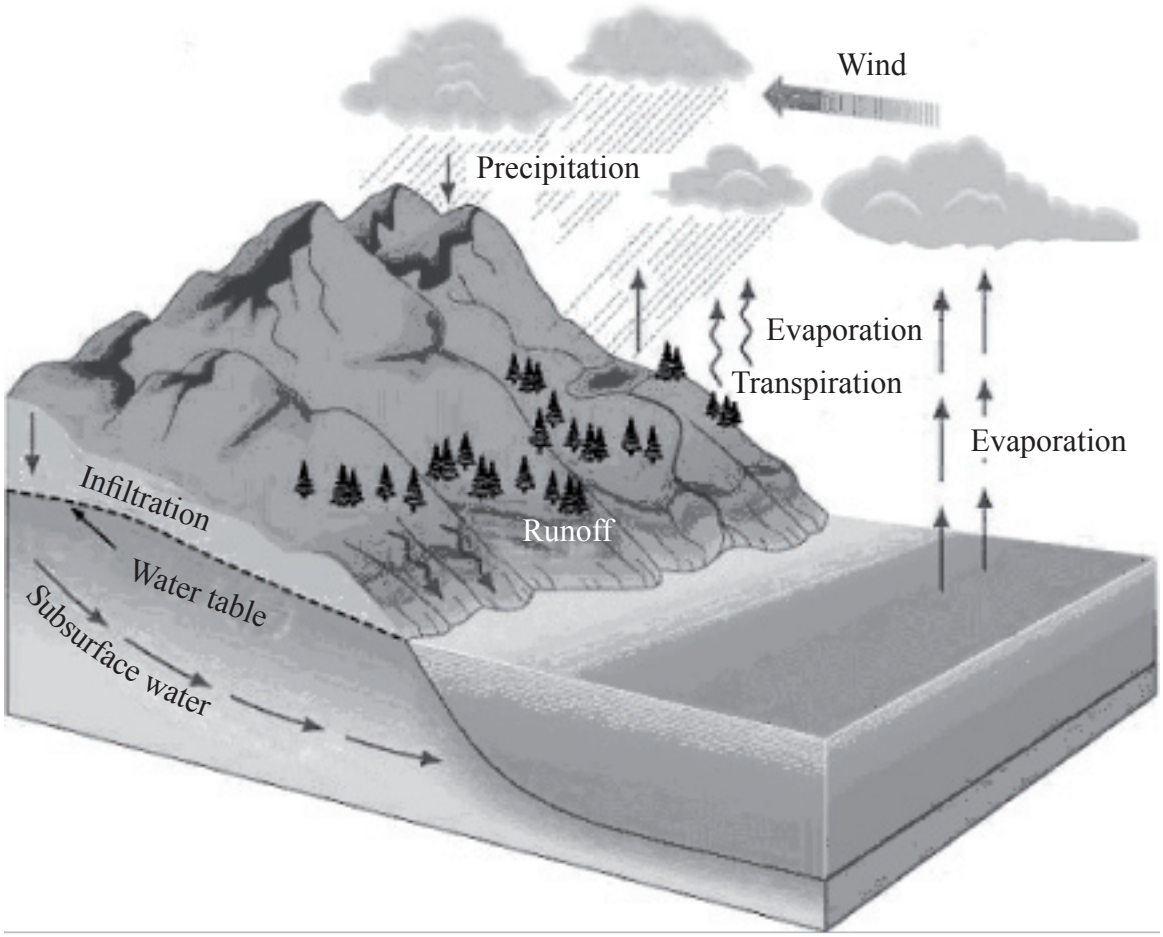
A. Carrying capacity

B. Positive feedback

C. Negative feedback

D. Steady state equilibrium

3. Below is a diagram of the hydrological cycle.



Which of the following pairs consist of transformation processes only?

A. Precipitation and transpiration

B. Evaporation and transpiration

C. Precipitation and evaporation

D. Infiltration and runoff

4. Which type of factors are contained in the following list?

light intensity temperature range pH of soil disease dissolved gases

I. Biotic factors

II. Abiotic factors

III. Limiting factors for photosynthesis

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

5. Which of the following statements is correct?

A. An organism always belongs to the same trophic level.

B. Organisms in the highest trophic levels are usually less numerous than those lower down.

C. Marine ecosystems usually have fewer trophic levels than terrestrial ecosystems because they do not have producers.

D. Organisms in the highest trophic levels are usually the smallest in that ecosystem.

6. Which statements correctly describe the food chain below?

Flowering plant → insect larvae → snake → hawk

I. The snake is a secondary consumer.

II. This is an example of a terrestrial food web.

III. There are four different trophic levels.

IV. Flowering plants are producers.

A. III and IV only

B. II, III, and IV only

C. I, III, and IV only

D. I, II, III, and IV

7. Which of the following biomes has the largest daily fluctuations in temperature?

A. Tundra

B. Temperate forest

C. Tropical rainforest

D. Desert

8. Ants live on Acacia trees and consume the sugar produced by the tree. The tree is protected by the ants, as they attack any foreign insects that may harm the tree. This is an example of

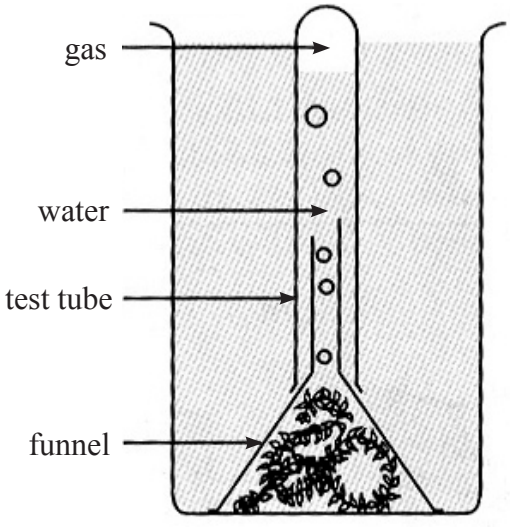
A. parasitism.

B. mutualism.

C. predation.

D. competition.

9. A piece of pondweed was placed in a beaker as shown below. The beaker was then placed in sunlight for six hours.



[Source: modified from Michael Roberts, *The Living World* (Second Edition), page 143]

The bubbles of gas in the diagram are composed mainly of

A. carbon monoxide.

B. carbon dioxide.

C. nitrogen.

D. oxygen.

10. Net primary productivity in an ecosystem is the amount of energy

A. fixed by the herbivores.

B. fixed by the herbivores, less losses due to respiration by herbivores.

C. fixed by photosynthesis.

D. fixed by photosynthesis, less losses due to respiration by producers.

11. A farmer gives 100 kg of food per day to a herd of cows. The cows use 55 kg of this for respiration and 35 kg are released as feces. Which of the following are the correct values for gross and net productivity?

	Gross Productivity / kg day^{-1}	**Net Productivity / kg day^{-1}**
A.	100	10
B.	65	10
C.	45	65
D.	10	90

12. "S" and "J" curves are likely to represent

A. population growth.

B. survivorship rates.

C. age structure of population.

D. population density by trophic levels.

13. Which of the following is a density dependent factor that could control the size of the population of eagles?

A. Unfavourable weather conditions

B. Abundance of food

C. Destruction of nesting sites by human activities

D. Increased use of pesticides

14. Use the information in the following table to determine whether the species are *r*- or *K*-strategists.

Animal	**Lifespan**	**Average number of offspring per lifespan**
Mayfly	3 days	100-200
Deer	5-6 years	3-5
Human	55-90 years	2-4

	Mayfly	**Deer**	**Human**
A.	*r*	*r*	*K*
B.	*K*	*r*	*r*
C.	*r*	*K*	*K*
D.	*K*	*K*	*r*

15. The establishment of biotic communities in a completely new environment such as a sandbar or a new volcanic island is an example of

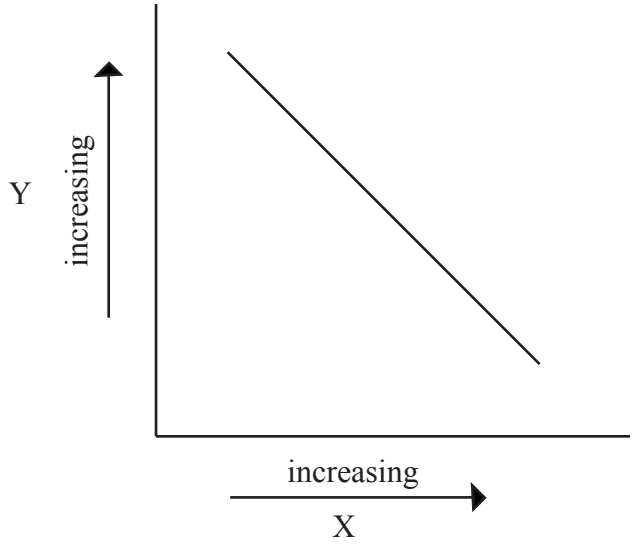
A. a fundamental niche.

B. zonation.

C. climax community.

D. primary succession.

16. What are the labels on the X and Y axis in the graph below representing lapse rate?



	X	Y
A.	Latitude	Temperature
B.	Latitude	Air pressure
C.	Temperature	Altitude
D.	Air pressure	Altitude

17. Ultraviolet radiation from the sun is absorbed by ozone in the

A. troposphere.

B. stratosphere.

C. thermosphere.

D. ionosphere.

18. The incidence of skin cancer might rise as a result of

A. the emission of CFCs.

B. the burning of fossil fuels.

C. formation of stratospheric ozone.

D. formation of photochemical smog.

19. Which of the following conditions affect the formation of photochemical smog?

I. Concentration of nitrogen oxides and volatile organic compounds

II. Light intensity

III. Topography

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

20. The table below shows how the concentration of atmospheric gases has changed from 1750 to 2005.

Gases	**Concentration in 1750 / ppm**	**Concentration in 2005 / ppm**
Carbon dioxide	280	381
Methane	0.70	1.80
CFCs	0	9×10^{-4}

Which of the following statements can be deduced from the data?

A. Human activities are the source of these gases.

B. Emissions of CFCs are the major environmental problem.

C. The concentration of greenhouse gases is increasing.

D. The ozone layer is thinning.

21. Scandinavian lakes have become more acidic, this is caused by

I. burning of fossil fuels

II. release of methane from wetlands

III. deforestation

A. I only

B. III only

C. I and III only

D. I, II, and III

22. Which of the following statements related to the Earth's water budget is/are correct?

I. More water evaporates from oceans than precipitates into oceans.

II. The excess amount of water that precipitates onto land is equal to the excess amount of water that evaporates from oceans.

III. The reason that the land does not become waterlogged and the oceans do not dry up is that the extra precipitation on land drains into rivers and groundwater.

A. I only

B. II only

C. II and III only

D. I, II and III

23. Which of these lists only includes factors that control temperature at any given location on Earth?

A. ocean currents, distance from the sea, latitude

B. latitude, level of eutrophication, altitude

C. ocean currents, pH of oceans, latitude

D. altitude, distance from the sea, level of eutrophication

24. Which of the following statements about "El Niño" is correct?

A. El Niño is a reversal of the normal circulation of air and ocean currents in the Atlantic Ocean.

B. El Niño decreases the surface water temperatures of the ocean and consequently increases productivity.

C. El Niño causes drought in some areas and increases precipitation in others, causing floods.

D. El Niño occurs every year, lasts about two days and is accompanied by changes in atmospheric and weather patterns which extend beyond the immediate area.

25. Evidence that supports the theory of continental drift has been provided by

A. changes in the rotation of Earth.

B. similar fossils found in South America and Africa.

C. the presence of mineral deposits in Southern Africa.

D. the direction of flow of the ocean currents.

26. The results of the analysis of a soil indicated large pores between the particles, low fertility and poor water retention capability. What type of soil is it likely to have been?

A. Loam

B. Clay

C. Sand

D. Humus

27. Which of the following would probably prevent a human population from growing exponentially?

A. Taxation of families with more than 2 children

B. Improvements in the treatment of diseases

C. Decrease in the average age that a woman has her first child

D. Improvements on irrigation of arid lands

28. Which row shows values for the crude birth rate and crude death rate for a population with a natural increase rate of 2 %?

	Crude birth rate (per thousand)	Crude death rate (per thousand)
A.	10	30
B.	30	10
C.	10	8
D.	8	10

29. Groundwater is a form of natural capital which is

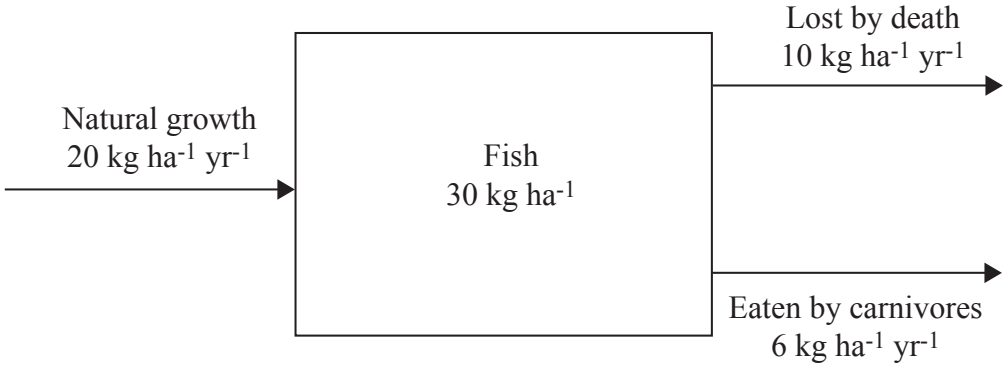
A. renewable and non-living.

B. non-renewable and non-replenishable.

C. renewable and non-replenishable.

D. replenishable and non-living.

30. The figure below represents a small lake and the annual changes in biomass. What is the approximate sustainable yield of the lake (in kg ha^{-1} yr^{-1})?



A. 4

B. 14

C. 16

D. 36