

1. A stable pond ecosystem would *not* contain
  - 1) materials being cycled
  - 2) oxygen
  - 3) decomposers
  - 4) more consumers than producers
  
2. Which statement describes all stable ecosystems?
  - 1) Herbivores provide energy for the autotrophs,
  - 2) The populations of predators are dependent on the populations of their prey.
  - 3) The number of autotrophs equals the number of heterotrophs.
  - 4) Consumers synthesize ATP from light energy.
  
3. Which statement best describes a characteristic of an ecosystem?
  - 1) It must have producers and consumers but not decomposers.
  - 2) It is stable because it has consumers to recycle energy.
  - 3) It always has two or more different autotrophs filling the same niche.
  - 4) It must have organisms that carry out autotrophic nutrition.
  
4. The maintenance of a self-sustaining ecosystem requires a
  - 1) constant temperature
  - 2) greater number of herbivores than producers
  - 3) cycling of materials between organisms and their environment
  - 4) soil that is acidic
  
5. Which statement concerning an ecosystem is correct?
  - 1) It can exist with or without a constant source of energy input.
  - 2) It must contain consumers but can exist without producers.
  - 3) It involves interactions between biotic and abiotic factors.
  - 4) It can exist on land, but it cannot exist in lakes, rivers, or oceans.
  
6. The size of a frog population in a pond remains fairly constant over a period of several years because of
  - 1) decreasing competition
  - 2) environmental carrying capacity
  - 3) excessive dissolved oxygen
  - 4) the depth of water
  
7. Abiotic factors that characterize a forest ecosystem include
  - 1) light and biodiversity
  - 2) temperature and amount of available water
  - 3) types of procedures and decomposers
  - 4) pH and number of heterotrophs
  
8. All the red foxes inhabiting a given forest constitute a
  - 1) population
  - 2) community
  - 3) biome
  - 4) biosphere

9. Which ecological term includes everything represented in the illustration below?



1) ecosystem

2) community

3) population

4) species

10. One biotic factor that affects consumers in an ocean ecosystem is

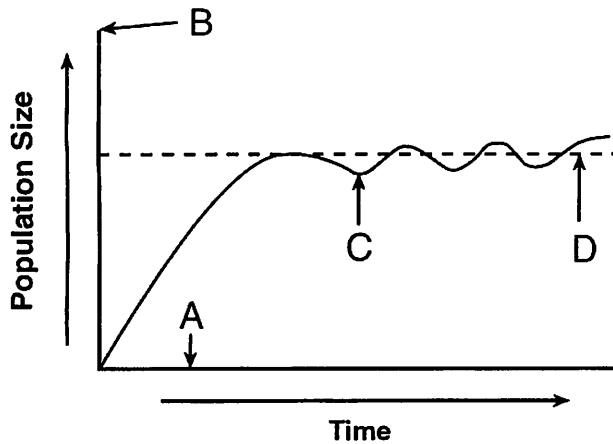
1) number of autotrophs

3) salt content

2) temperature variation

4) pH of water

11. The growth of a population is shown in the graph below.



Which letter indicates the carrying capacity of the environment for this population?

1) A

3) C

2) B

4) D

12. Ecosystems will have a greater chance of maintaining equilibrium over a long period of time if they have

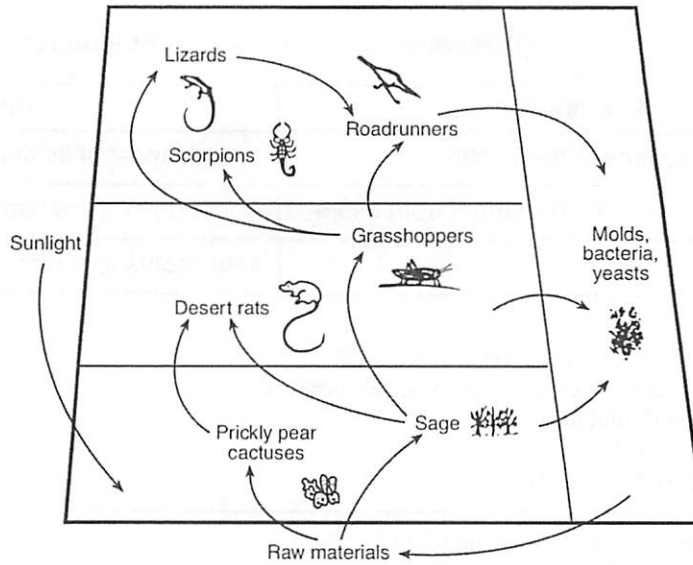
1) organisms imported by humans from other environments

2) a sudden change in climate

3) a diversity of organisms

4) predators eliminated from the food chains

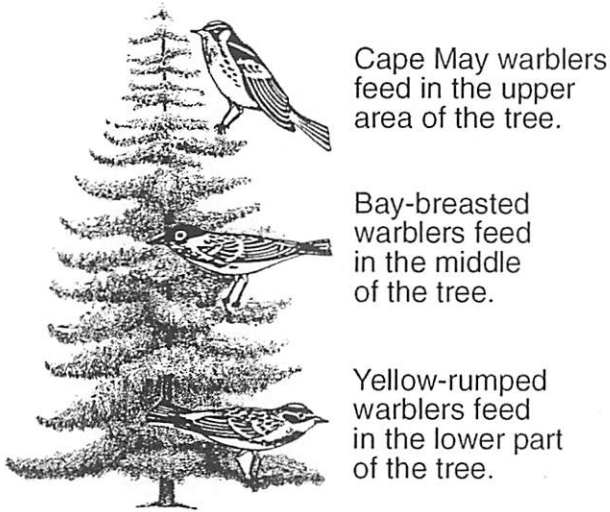
13. Some interactions in a desert community are shown in the diagram below.



Which statement is a valid inference based on the diagram?

- 1) Certain organisms may compete for vital resources.
- 2) All these organisms rely on energy from decomposers.
- 3) Organisms synthesize energy.
- 4) All organisms occupy the same niche

14. The ecological niches of three bird species are shown in the diagram below.



What is the advantage of each bird species having a different niche?

- 1) As the birds feed higher in the tree, available energy increases.
- 2) More abiotic resources are available for each bird.
- 3) Predators are less likely to feed on birds in a variety of locations.
- 4) There is less competition for food.

15. Which component of a stable ecosystem can *not* be recycled?

- 1) oxygen
- 2) water
- 3) energy
- 4) nitrogen

16. A scientist studied iguanas inhabiting a chain of small ocean islands. He discovered two species that live in different habitats and display different behaviors. His observations are listed in the table below.

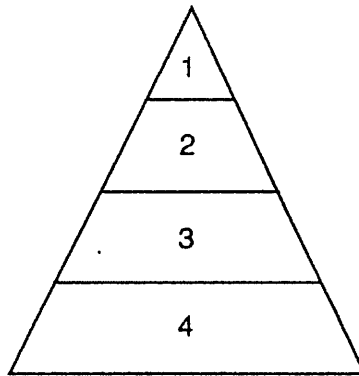
**Observations of Two Species of Iguanas**

<b>Species A</b>	<b>Species B</b>
spends most of its time in the ocean	spends most of its time on land
is rarely found more than 10 meters from shore	is found many meters inland from shore
eats algae	eats cactus and other land plants

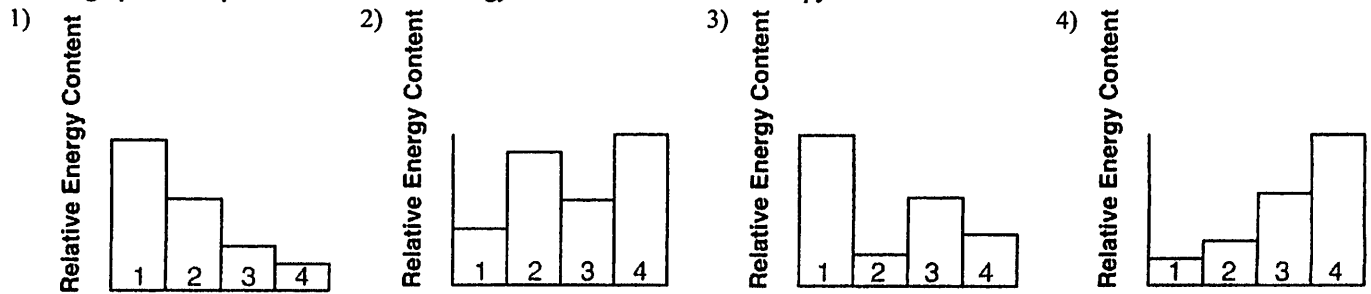
Which statement best describes these two species of iguanas?

- 1) Both species evolved through the process of ecological succession.
  - 2) Each species occupies a different niche.
  - 3) The two species can interbreed.
  - 4) Species A is a scavenger and species B is a carnivore.
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17. Which ecosystem has a better chance of surviving when environmental conditions change over a long period of time?
- 1) one with a great deal of genetic diversity
  - 2) one with plants and animals but no bacteria
  - 3) one with animals and bacteria but no plants
  - 4) one with little or no genetic diversity
18. In December 2004, a tsunami (giant wave) destroyed many of the marine organisms along the coast of the Indian Ocean. What can be expected to happen to the ecosystem that was most severely hit by the tsunami?
- 1) The ecosystem will change until a new stable community is established.
  - 2) Succession will continue in the ecosystem until one species of marine organism is established.
  - 3) Ecological succession will no longer occur in this marine ecosystem.
  - 4) The organisms in the ecosystem will become extinct.
19. In an ecosystem, the growth and survival of organisms are dependent on the availability of the energy from the Sun. This energy is available to organisms in the ecosystem because
- 1) producers have the ability to store energy from light in organic molecules
  - 2) consumers have the ability to transfer chemical energy stored in bonds to plants
  - 3) all organisms in a food web have the ability to use light energy
  - 4) all organisms in a food web feed on autotrophs

20. An energy pyramid is shown below.



Which graph best represents the relative energy content of the levels of this pyramid



21. Species *A*, *B*, *C*, and *D* are all different heterotrophs involved in the same food chain in an ecosystem. The chart below shows the population of each species at the same time on a summer day.

Species	Population
A	847
B	116
C	85
D	6

Which statement best describes one of these species of heterotrophs?

- 1) Species *A* is the most numerous because it can make its own food.
- 2) Species *B* probably feeds on species
- 3) Species *C* and *B* interbred to produce species
- 4) Species *D* is most likely the top predator in the food chain.

Base your answers to questions 22 and 23 on the passage below and on your knowledge of biology.

### Decline of the Salmon Population

Salmon are fish that hatch in a river and swim to the ocean where their body mass increases. When mature, they return to the river where they were hatched and swim up stream to reproduce and die. When there are large populations of salmon, the return of nutrients to the river ecosystem can be huge. It is estimated that during salmon runs in the Pacific Northwest in the 1800s, 500 million pounds of salmon returned to reproduce and die each year. Research estimates that in the Columbia River alone, salmon contributed hundreds of thousands of pounds of nitrogen and phosphorus compounds to the local ecosystem each year. Over the past 100 years, commercial ocean fishing has removed up to two-thirds of the salmon before they reach the river each year.

22. Identify *one* organism, other than the salmon, that would be present in or near the river that would most likely be part of a food web in the river ecosystem.

23. Identify the process that releases the nutrients from the bodies of the dead salmon, making the nutrients available for other organisms in the ecosystem.

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24. Base your answer to the following question on the information below and on your knowledge of biology.

Scientists are increasingly concerned about the possible effects of damage to the ozone layer.

Lawn wastes, such as grass clippings and leaves, were once collected with household trash and dumped into landfills. Identify *one* way that this practice was harmful to the environment.

25. Base your answer to the following question on the information below and on your knowledge of biology.

The last known wolf native to the Adirondack Mountains of New York State was killed over a century ago. Several environmental groups have recently proposed reintroducing the wolf to the Adirondacks. These groups claim there is sufficient prey to support a wolf population in this area. These prey include beaver, deer, and moose. Opponents of this proposal state that the Adirondacks already have a dominant predator, the Eastern coyote.

Explain why the coyote is considered a limiting factor in the Adirondack Mountains.

26. Base your answer to the following question on the information below and on your knowledge of biology.

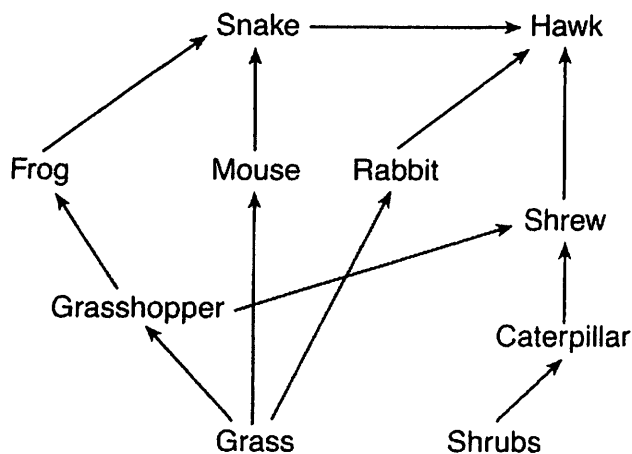
Amphibians have long been considered an indicator of the health of life on Earth. Scientists are concerned because amphibian populations have been declining worldwide since the 1980s. In fact, in the past decade, twenty species of amphibians have become extinct and many others are endangered.

Scientists have linked this decline in amphibians to global climatic changes. Warmer weather during the last three decades has resulted in the destruction of many of the eggs produced by the Western toad. Warmer weather has also led to a decrease in rain and snow in the Cascade Mountain Range in Oregon, reducing the water level in lakes and ponds that serve as the reproductive sites for the Western toad. As a result, the eggs are exposed to more ultraviolet light. This makes the eggs more susceptible to water mold that kills the embryos by the hundreds of thousands.

State *two* ways the decline in amphibian populations could disrupt the stability of the ecosystems they inhabit.

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27. Base your answer to the following question on the diagram below that shows some interactions between several organisms located in a meadow environment and on your knowledge of biology.



A rapid *decrease* in the frog population results in a change in the hawk population. State how the hawk population may change. Support your answer.

28. Base your answer to the following question on the information below and on your knowledge of biology.

A student uses a covered aquarium to study the interactions of biotic and abiotic factors in an ecosystem. The aquarium contains sand, various water plants, algae, small fish, snails, and decomposers. The water contains dissolved oxygen and carbon dioxide, as well as tiny amounts of minerals and salts.

Describe *one* specific way the use of this food by the decomposers benefits the other organisms in the aquarium.

29. Base your answer to the following question on the information below and on your knowledge of biology.

A pond in the Adirondack Mountains of New York State was once a fishing spot visited by many people. It was several acres in size, and fishermen in boats were a common sight. Over time, the pond has become smaller in area and depth. Places where there was once open water are now covered by grasses and shrubs. Around the edges of the pond there are cattails and other wetland plants.

Predict what will most likely happen to this pond area over the next hundred years if this process continues.

30. Base your answer to the following question on the passage below and on your knowledge of biology.

#### **Great Effects on the Great Lakes due to Global Warming**

Trees such as the jack pine, yellow birch, red pine, and white pine may no longer be able to grow in the Great Lakes region because summers are becoming warmer. However, other trees such as black walnut and black cherry may grow in the area, given enough time. The change in weather would favor these new tree species.

The Great Lakes region is the only place in the world where the endangered Kirtland's Warbler breeds. This bird species nests in young jack pine trees (5 to 23 years old). The vegetation must have specific characteristics or the birds will not nest. A specific area of Michigan is one of the few preferred areas. If the jack pines can no longer grow in this area, the consequences for the Kirtland's Warbler could be devastating.

Recent research findings also suggest that algae production in Lake Ontario and several other Great Lakes will be affected as warmer weather leads to warmer lake water. An increase in water temperature reduces the ability of water to hold dissolved oxygen. These changes have implications for the entire Great Lakes food web. Changes in deep-water oxygen levels and other habitat changes may prevent the more sensitive cold-water fish from occupying their preferred niches in a warmer climate.

All other factors being equal, climatic changes may not have a negative effect on every species in the Great Lakes region. This is because the length of the growing season would be increased. Some temperature-sensitive fish could move to cooler, deeper water when the surface water temperatures become too high. The total impact of global warming is difficult to predict.

Identify one producer found in the water of Lake Ontario.