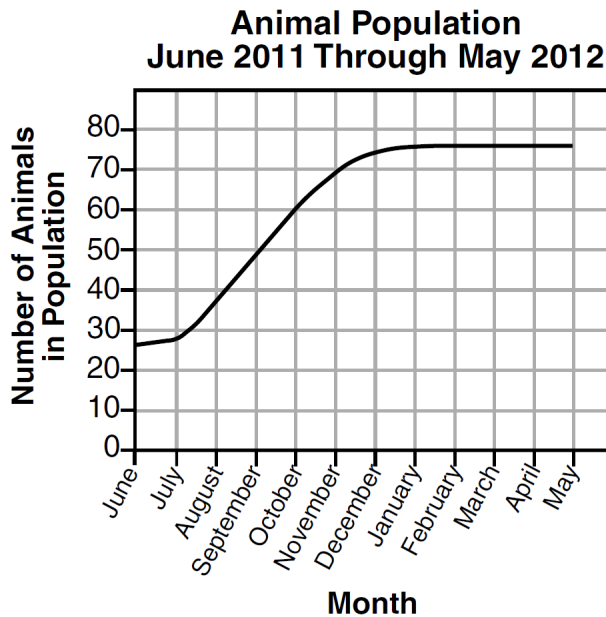


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1. In a sewage treatment facility, an optimal environment is maintained for the survival of naturally occurring species of microorganisms. These organisms can then break the sewage down into relatively harmless wastewater. For these microorganisms, the wastewater facility serves as

- A) its carrying capacity
- B) a food chain
- C) an ecosystem
- D) an energy pyramid

2. Base your answer to the following question on the information and graph below and on your knowledge of biology. The graph shows the number of animals in a population throughout the course of a year. The population migrated into the area at the beginning of 2011.



The approximate number of animals that were found in June 2012 was most likely

- A) 16
  - B) 26
  - C) 76
  - D) 86
-

- 
3. Base your answer to the following question on the following information and photograph and on your knowledge of biology.

### Wild Horse Roundup



Source: <http://tuesdayshorse.wordpress.com/2012/10/31/outrage-over-advisory-board-proposal-to-sterilize-wild-mustangs/>

Wild horses called mustangs roam acres of federally owned land in the western United States. These horses have overgrazed the local vegetation to the extent that plants and soils are being lost entirely.

When the number of mustangs that roam the land exceeds the number of horses that the land can sustain, the government organizes helicopter-driven roundups. The horses are guided into a roped-off area and then are sold to the public or brought to pastures in the Midwest. About one percent of the horses captured die from injuries or accidents that occur during roundups.

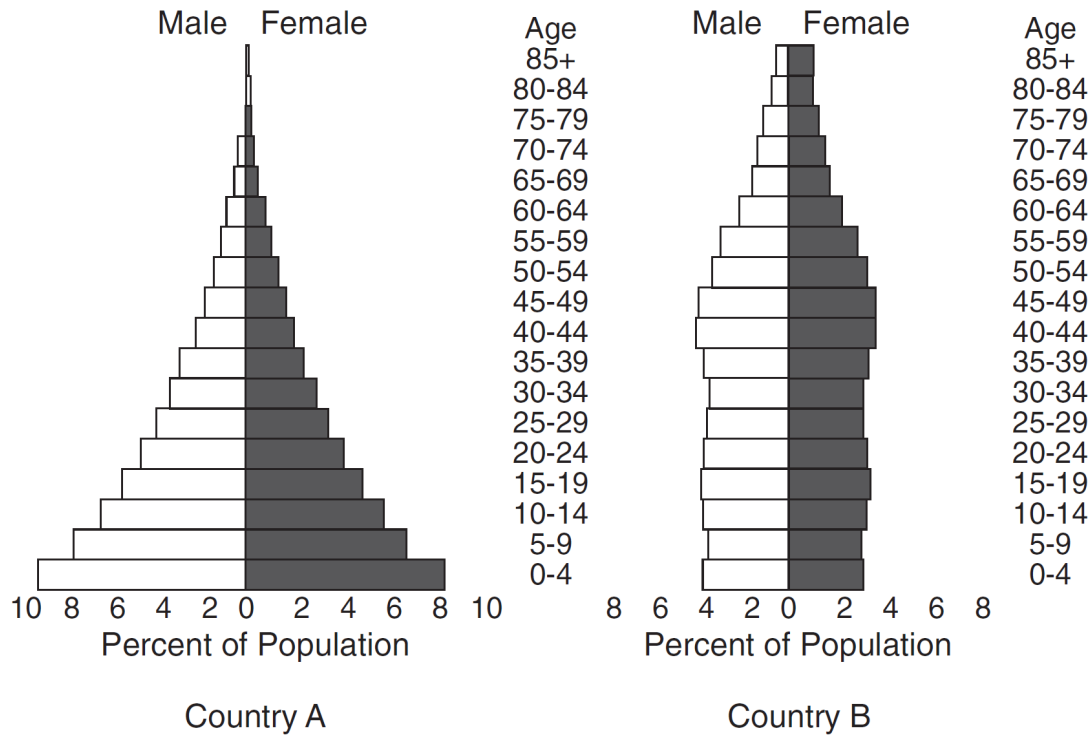
The number of organisms that an area of land can sustain over a long period of time is known as

- A) ecological succession                      B) its finite resources  
C) its carrying capacity                        D) evolutionary change

- 
4. Carnivorous plants, such as pitcher plants and sundews, live in bogs where many other organisms cannot. Due to the high rate of decomposition occurring in bogs, the environment is acidic and contains very little oxygen and nutrients. The bogs only support certain types of organisms because

- A) organisms in an environment are not limited by available energy and resources  
B) the growth and survival of organisms depends upon specific physical conditions  
C) favorable gene mutations only occur when organisms live in harsh environments  
D) photosynthetic organisms can only inhabit environments that have a low acidity
-

5. Base your answer to the following question on the diagram below and on your knowledge of biology. The diagram represents the current percentage of each population by age and gender (male/female) for two countries.



Adapted from: *Campbell Biology, 8th edition*

Approximately what percent of the population of Country A is less than 10 years old?

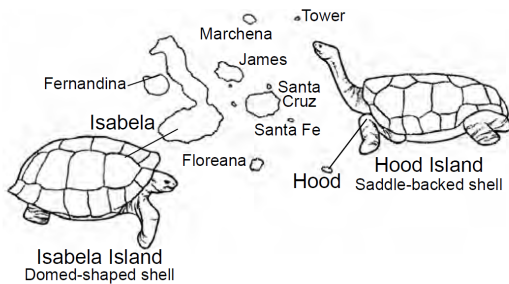
- A) 8%      B) 16%      C) 32%      D) 64%

6. A corn field includes corn plants, mice, hawks, and various insects, fungi, and bacteria. Which nutritional role is correctly paired with organisms that carry out that role?

- A) heterotrophs - corn and bacteria  
B) producers - insects and fungi  
C) consumers - mice and insects  
D) decomposers - hawks and bacteria

7. Base your answer to the following question on the information below and on your knowledge of biology. The diagram represents some of the various types of giant tortoises that live on the Galapagos Islands. The chart provides information about some individual island environments.

### Giant Tortoises of the Galapagos Islands



Source: Adapted from <http://slideplayer.com/slide/7372273>

### Environmental Conditions on Certain Galapagos Islands

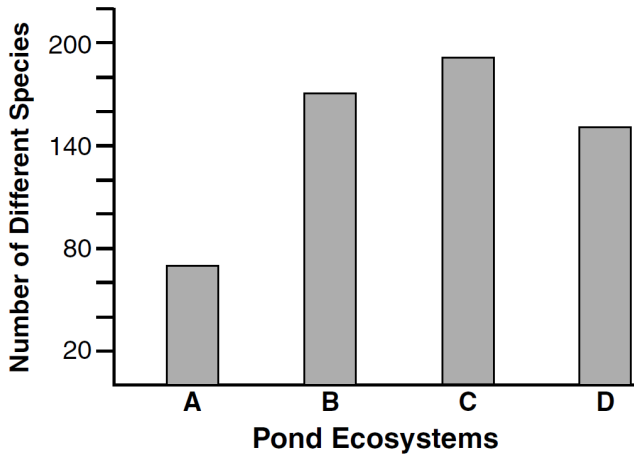
Galapagos Island	Island Characteristics
Hood Island	sparse vegetation located high off of the ground; hot, dry, arid
Isabela Island	rich variety of vegetation located low to the ground; much rainfall; humid

Over the years, human activity introduced organisms such as goats and other herbivores to the Galapagos Islands. The addition of these invasive organisms caused the tortoise species to be threatened because there was

- A) an increase in competition for food sources
  - B) a decrease in ecological succession
  - C) an increase in the availability of vegetation
  - D) a decrease in direct harvesting
- 
8. Two organisms of different species are *not* likely to compete for the same
- A) food B) mate C) space D) water
9. The removal of the predator populations from an ecosystem would most likely result in
- A) a decrease in all the prey populations
  - B) an increase in all the producer populations
  - C) an increase in ecosystem diversity
  - D) a decrease in ecosystem diversity

- 
10. The bar graph below shows the number of species in four pond ecosystems.

**Number of Species in Four Pond Ecosystems**



Based on this information, which ecosystem is likely to be the most stable?

- A) *A*    B) *B*    C) *C*    D) *D*
11. The governments of many countries have regulations that are designed to prevent the accidental introduction of nonnative insects into their countries. This is because, in these new habitats, the nonnative insects might
- A) become food for birds
  - B) not survive a cold winter
  - C) not have natural predators
  - D) add to the biodiversity
-

- 
12. The brown tree snake was accidentally introduced to the island of Guam during World War II. Since then, this snake has caused the extinction of twelve native bird species by eating their eggs and young.



Source: [www.aquariumlife.com.au](http://www.aquariumlife.com.au)

One negative result of this snake's introduction was most likely

- A) an increase in diversity as new species evolved to replace extinct species
  - B) an increase in mosquitoes due to an increase in bird species in the environment
  - C) a disruption of food chains and food webs in Guam's ecosystems
  - D) an abundance of brown tree snakes as a good source for humans
13. The chart below shows a sequence of events that was observed at an abandoned ski center over a period of years.

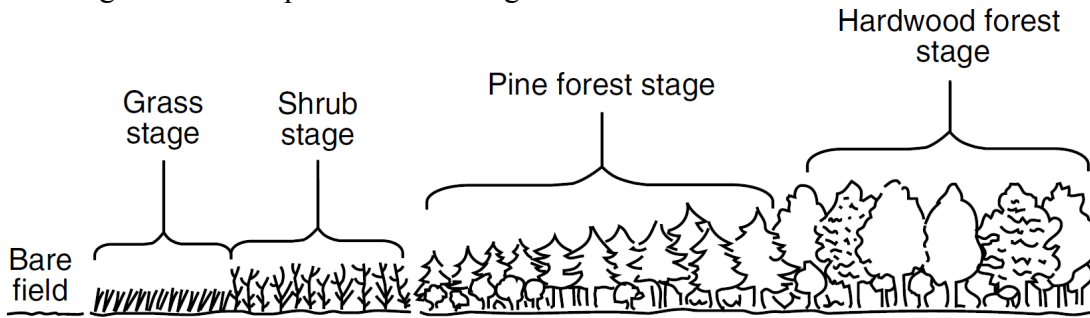
**Changes in Plant Species Over Time**

Year	Dominant Plant Species Observed
1985	grasses
1995	shrubs and bushes
2005	cherry, birch, and poplar trees

This sequence of changes is the result of

- A) ecological succession
  - B) decreased biodiversity
  - C) biological evolution
  - D) environmental trade-offs
-

14. The diagram below represents the changes over time in an area.



Which example is *not* a natural process that could return a hardwood forest to the grass stage once again?

- A) a forest fire caused by a lightning strike
- B) the aging and falling of trees
- C) clearing the land for agriculture
- D) a hurricane or tornado

Base your answers to questions 15 and 16 on the information below and on your knowledge of biology.

Mercury is a toxic chemical that accumulates in the tissues of animals in a food chain. The chart below shows mercury levels found in various commercial fish and shellfish.

**Mercury Concentration**

Species	Average Mercury Concentration (ppm)	Number of Samples
king mackerel	0.730	213
shark	0.979	356
swordfish	0.995	636
tilefish (Gulf of Mexico)	1.450	60
catfish	0.025	57
haddock	0.055	50
lobster (spiny)	0.093	13

Source: [www.fda.gov/food/foodborneillnesscontaminants/metals/ucm115644.html](http://www.fda.gov/food/foodborneillnesscontaminants/metals/ucm115644.html)

15. Which statement is best supported by the data in the chart?

- A) Any fish caught in the Gulf of Mexico would have low levels of mercury.
- B) Eating catfish or haddock would be most likely to cause deadly mercury poisoning.
- C) Spiny lobsters may have more or less mercury than indicated because only a few were sampled.
- D) Tilefish are the most nutritious of all the species listed.

16. Each species listed is a predator. If the prey organisms that each predator consumes were tested, they would most likely contain

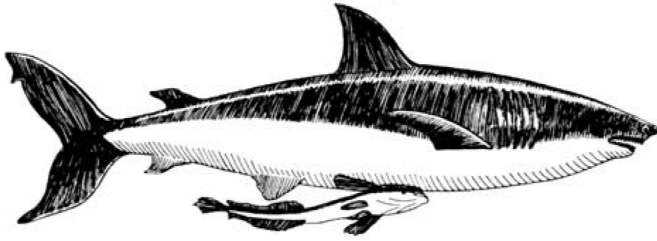
- A) the same amount of mercury as the predator species
- B) less mercury than the predator species
- C) more mercury than the predator species
- D) no mercury, since the predators probably get it from the polluted water

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17. When handling cat litter, humans can potentially be exposed to a harmful single-celled protozoan. Its primary host is the common domestic cat, but it can also live in humans. This protozoan is an example of a

- A) predator
- B) producer
- C) parasite
- D) scavenger

18. The diagram below represents a remora fish attached to a shark.



A remora fish has an adhesive disk or sucker on its head, which it uses to attach itself to larger fishes, such as sharks. This attachment causes the shark no harm. The remora fish eat scraps of food that the sharks drop as they feed. This is an example of

- A) an adaptation to a specialized niche
- B) an adaptation of a successful parasite
- C) competition between two fish species for food
- D) competition for abiotic resources

---

19. Which statement is an example of the interdependence of organisms?

- A) Owls hunt at night.
- B) Ants get food from insects and protect insects from predators.
- C) Ticks feed on the blood of animals and the ticks grow larger.
- D) Crows feed on dead mice.

20. A fruit fly is classified as a consumer rather than as a producer because it is unable to

- A) reproduce asexually
- B) synthesize its own food
- C) release energy stored in organic molecules
- D) remove wastes from its body

21. Producers are generally found at the beginning of a food chain. Which statement best explains why this is true?

- A) Producers are usually smaller in size than consumers.
- B) Producers do not rely on other organisms for food.
- C) There are always more consumers than producers in food chains.
- D) Consumers are always more complex organisms than producers.

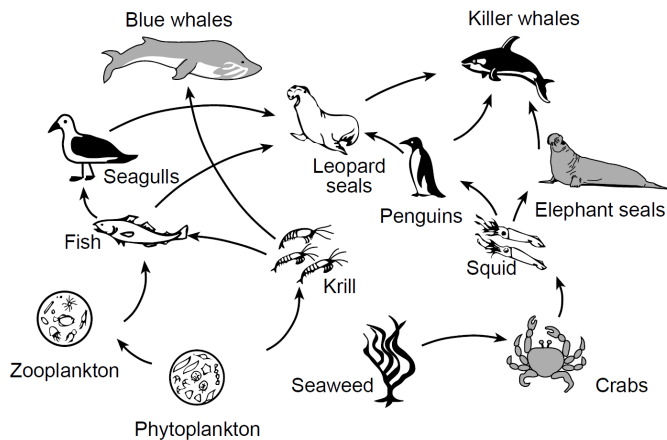
22. Which process occurs at each link in a food chain?

- A) All the energy is stored in a newly made structure.
  - B) Some energy is released into the environment as heat.
  - C) Chemical energy is recycled.
  - D) Atoms cycle among living organisms, producing energy.
-



23. A food web is represented in the diagram below.

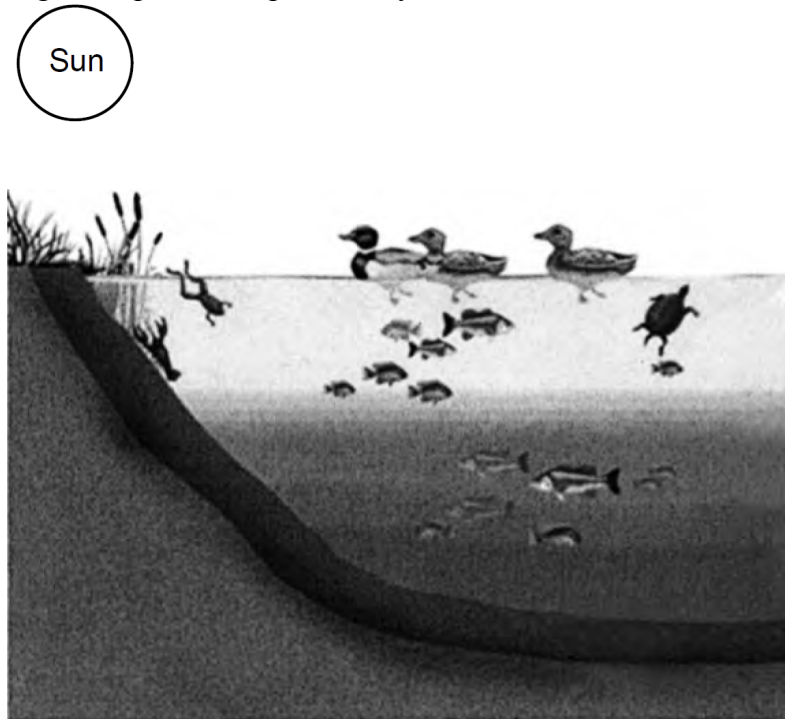
**Ocean Food Web**



Adapted from: [www.siyavula.com/gr7-9-websites/natural-sciences/gr8/gr8-11-02.html](http://www.siyavula.com/gr7-9-websites/natural-sciences/gr8/gr8-11-02.html)

If the fish population decreases, what is the most direct effect this will have on the aquatic ecosystem?

- A) The leopard seals will all die from lack of food.
  - B) The krill population will only be consumed by seagulls.
  - C) The zooplankton population will increase in size.
  - D) The phytoplankton population will increase in size.
24. Base your answer to the question on the diagram below and on your knowledge of biology. The diagram represents a pond ecosystem.



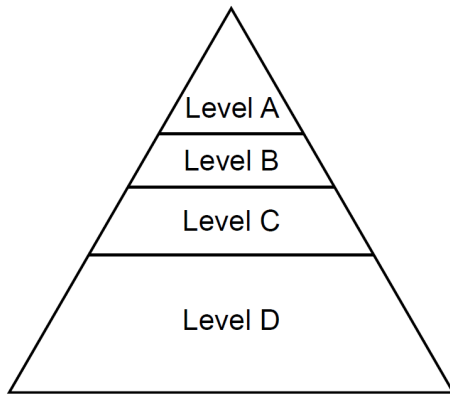
Source: [freshwaterecosystemswebquest.wikispaces.com/ponds,+lakes,+and+inland+seas](http://freshwaterecosystemswebquest.wikispaces.com/ponds,+lakes,+and+inland+seas)

Energy in this ecosystem passes directly from the Sun to

- A) herbivores
- B) consumers
- C) heterotrophs
- D) autotrophs

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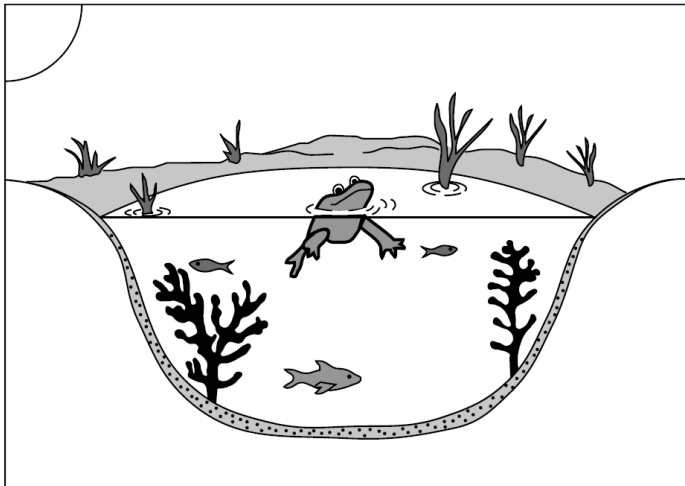
25. The diagram below represents an energy pyramid.



In this pyramid, the greatest amount of stored energy is found at level

- A) *A*    B) *B*    C) *C*    D) *D*

26. The diagram below represents a pond ecosystem.



Identify *one* abiotic factor present in the pond ecosystem and explain how this abiotic factor would affect the frogs in the pond.

Base your answers to questions 27 and 28 on the following information and on your knowledge of social studies.

### **Biomass Energy**

Biomass is the term for all living, or recently living, materials coming from plants and animals that can be used as a source of energy. Biomass can be burned to produce heat and used to make electricity. The most common materials used for biomass energy are wood, plants, decaying materials, and wastes, including garbage and food waste. Burning the wood and plant matter does produce some air pollutants. Biomass contains energy that originally came from the Sun. Some biomass can be converted into liquid biofuels. These biofuels can be used to power cars and machinery.

27. State *one* specific advantage and *one* specific disadvantage of the use of biofuels as an energy source.

28. Explain why biomass is considered a renewable energy source.

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

### Kaolin as a Spray to Control a Bean Pest

Spraying kaolin, a clay-like material, on the leaves of plants has been effective in reducing insect damage to plants that grow in temperate regions, but has not been tried in tropical areas.

Researchers in the tropical Andean region of South America have recently conducted experiments to see if kaolin can be used there to control the greenhouse whitefly, a significant pest of the region's bean crops.

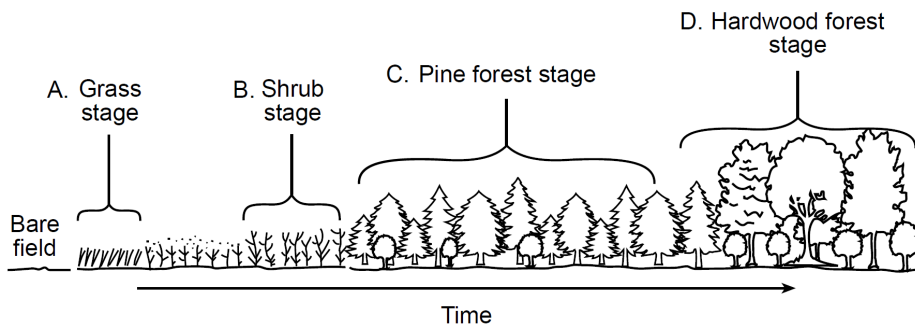
In the study, four groups of bean plants were used with the following treatments:

Group	Treatment	Whiteflies Killed (%)
1 (control)	No insecticide or other substance applied to the plants	0
2	Synthetic chemical insecticide applied to leaves	90
3	Leaves treated with 2.5% concentration of kaolin spray	80
4*	Leaves treated with 5% concentration of kaolin spray	80

\* Note: In group 4 the plants lost 40% less water and showed a 45% increase in chlorophyll content in the leaves.

State *one* reason why the scientists are interested in reducing whitefly populations in the Andean region.

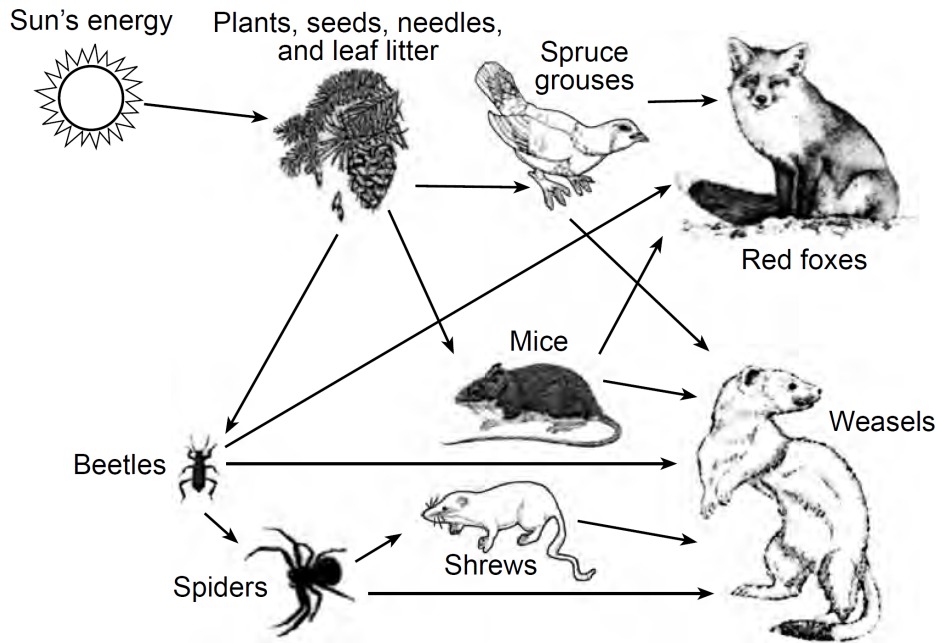
Base your answers to questions 30 through 32 on the information below and on your knowledge of biology. The diagram represents an ecological process that occurs in New York State over a long period of time.



30. Identify the short-term effect that a forest fire during stage *D* would have on the biodiversity of the area.
31. Identify *two* abiotic factors that can determine which types of organisms can inhabit an ecosystem.
32. Identify the ecological process that is represented from stage *A* through stage *D*, and explain why each stage is important to the stage that follows it.

Base your answers to questions 33 through 35 on the food web represented below and on your knowledge of biology. The food web contains some of the organisms found in Glacier National Park.

### Glacier National Park Food Web



Source: [www.nps.gov](http://www.nps.gov)

33. Describe how the niche of the mouse population differs from the niche of the shrew population in this ecosystem. Support your answer with information from the food web.
34. Explain why a major increase in the number of cloudy days that extends over a period of years would be expected to affect the populations of both plants and animals in this ecosystem.
35. Identify which group of organisms in this food web would contain the greatest amount of stored energy. Support your answer.