

Week 4
EOC Review
Ecology and Human Impact

Benchmarks:

SC.912.L.17.5 Analyze how population size is determined by births, deaths, immigration, emigration and limiting factors (biotic and abiotic) that determine carrying capacity.

SC.912.L.17.2 Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature

SC.912.L.17.4 Describe changes in ecosystems resulting from seasonal variations, climate change and succession

SC.912.L.17.8 Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.

SC.912.L.17.9 Use a food web to identify and distinguish producer, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels.

SC.912.E.7.1 Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.

SC.912.L.17.20 Predict the impact of individuals on environmental systems and examine, how human lifestyles affect sustainability

SC.912.L.17.11 Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests

SC.912.L.17.13 Discuss the need for adequate monitoring of environmental parameters when making policy decisions

Summary:

You need to know the following:

- How to use a food web to identify producers, consumers, and decomposers.
- The pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
- How matter and energy move through the water and carbon cycles.
- How population size is determined by births, deaths, immigration, emigration and limiting factors.
- Be able to use data about population dynamics, abiotic factors, and biotic factors to explain a change in carrying capacity and population size in an ecosystem.
- Different types of organisms exist within aquatic systems due to chemistry, geography, light, depth, salinity, and/or temperature.
- The potential changes in an ecosystem resulting from seasonal variations, climate changes and/or succession.
- The positive or negative consequences that result from a reduction in biodiversity.
- How the actions of humans may impact environmental systems and affect sustainability.
- The costs and benefits of renewable and nonrenewable resources.
- Environmental policy decisions should be made after adequate monitoring of environmental parameters.
- How the environment and personal health are related.

Additional Support

- Holt McDougal Biology Interactive Reader:
 - Chapter 13, Section 13.1, 13.2, 13.3, 13.4, 13.5, 13.6
 - Chapter 14, Section 14.1, 14.2, 14.4, 14.5
 - Chapter 16, Section 16.1, 16.2, 16.3, 16.4, 16.5
- Everglades Biology End-Of-Course Review
 - Pages 222-256
- Web Site
 - <http://www.ecsd-fl.schoolloop.com/BiologyEOCReview>
 - <http://fcats.fldoe.org/eoc/>

Sample Questions

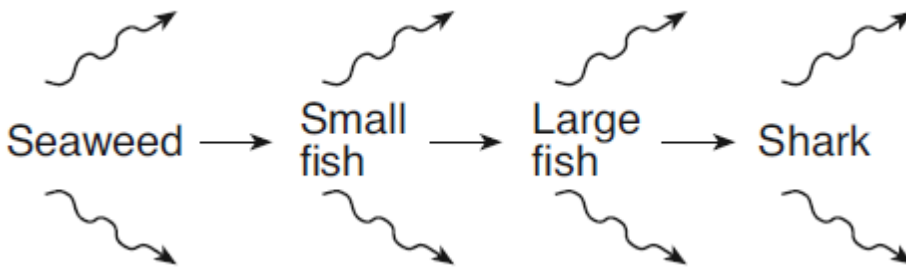
Week 4: ECOLOGY

SC.912.L.17.9 Food Webs and Energy Transfer

1. Coyotes are opportunistic predators that are found throughout most of North America. They typically feed on small mammals, insects, and fruits and vegetables. They are known for their dietary adaptability. The best description of their role in the food web would be:

- A. An herbivore
- B. A carnivore
- C. An omnivore
- D. A primary producer

2. A food chain is illustrated below:



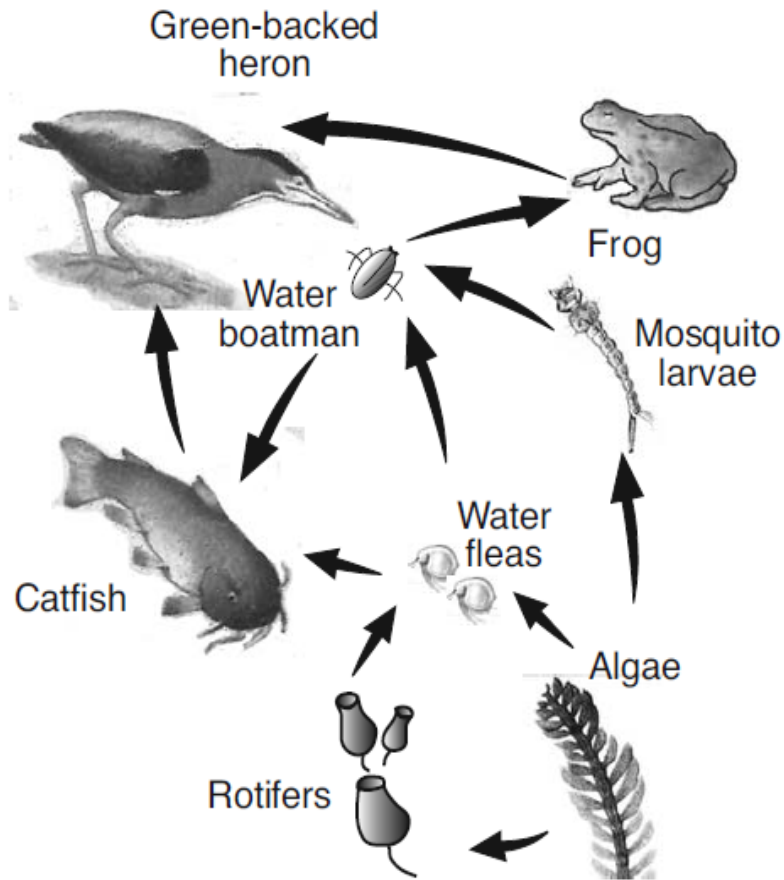
The arrows represented as  most likely indicate

- A. Energy released from metabolism into the environment as heat.
- B. Oxygen released from metabolism produced by cellular respiration.
- C. The absorption of energy from the environment that has been created.
- D. The transport of glucose away from the organism through photosynthesis.

3. If several species of carnivores are removed from an ecosystem, the most likely effect on the ecosystem will be:

- A. An increase in the kinds of autotrophs
- B. A decrease in the number of abiotic factors
- C. A decrease in stability among populations
- D. An increase in the rate of succession

4. A pond ecosystem is shown in the diagram below. Which statement describes an interaction that helps maintain the dynamic equilibrium of this ecosystem?



(Not drawn to scale)

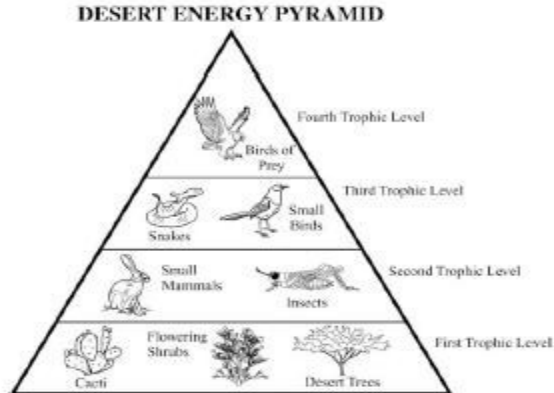
Which statement describes an interaction that helps maintain the dynamic equilibrium of this ecosystem?

- A. The frogs make energy available to this ecosystem through the process of photosynthesis.
- B. The algae directly provide food for both the rotifers and the catfish.
- C. The green-backed heron provides energy for the mosquito larvae.
- D. The catfish population helps control the populations of water boatman and waterfleas.

5. Why is a mushroom considered a heterotroph?

- A. It creates different types of food.
- B. It makes food through photosynthesis.
- C. It makes food through chemosynthesis.
- D. It obtains nutrients from its environment.

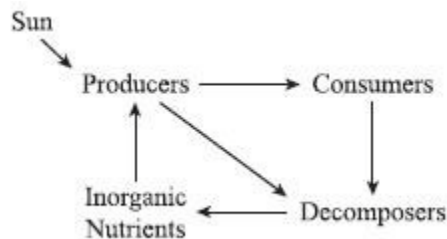
6. A team of ecologists observed feeding patterns of several populations in the desert. The energy pyramid shown below depicts the feeding patterns the ecologist observed.



Which of the following best explains the difference in the amount of available energy in the trophic levels of the desert ecosystem?

- A. There is less energy available in the producers because their tissues are less dense than those at higher trophic levels.
- B. There is more energy available in the second trophic level because less energy is needed for hunting compared to the higher trophic levels.
- C. There is more available energy in the birds of prey because they have greater muscle mass for storing energy than organisms in lower trophic levels have.
- D. There is less available energy in the fourth trophic level because of the loss of energy through metabolism in each of the lower trophic levels.

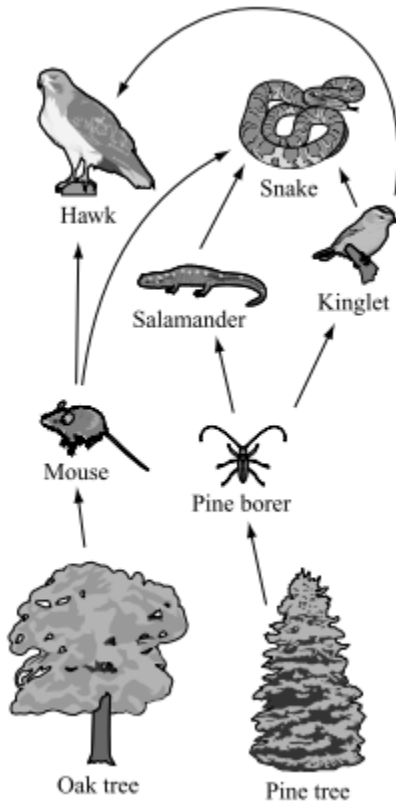
7. The diagram below shows the cycling of nutrients in an ecosystem.



The removal of which of the following groups would cause an immediate decrease in the amount of energy flowing through the system?

- A. Producers
- B. Consumers
- C. Decomposers
- D. Inorganic nutrients

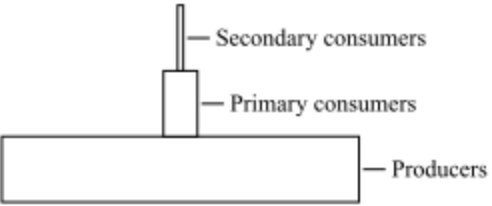
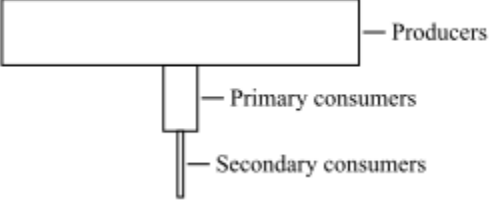
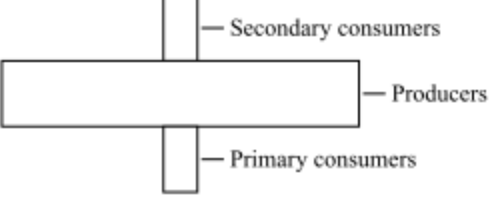
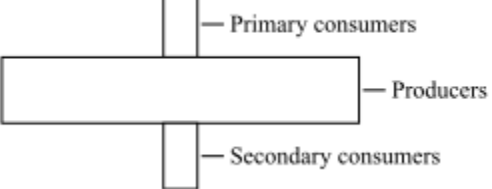
8. A food web is shown below.



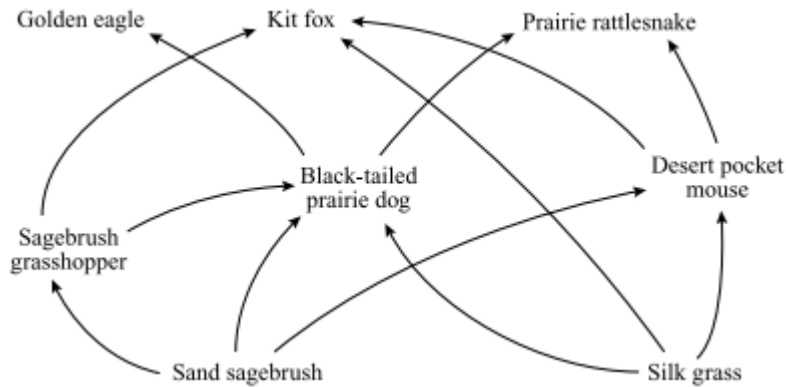
Which of the following organisms compete for the mouse as a food source?

- A. hawk and snake
- B. snake and kinglet
- C. oak tree and pine tree
- D. pine borer and salamander

9. Which of the following energy pyramids shows the correct placement of trophic levels?

- A.  Energy pyramid A consists of three horizontal bars. The top bar is the narrowest and is labeled "Secondary consumers". The middle bar is wider than the top bar and is labeled "Primary consumers". The bottom bar is the widest and is labeled "Producers".
- B.  Energy pyramid B consists of three horizontal bars. The top bar is the widest and is labeled "Producers". The middle bar is narrower than the top bar and is labeled "Primary consumers". The bottom bar is the narrowest and is labeled "Secondary consumers".
- C.  Energy pyramid C consists of three horizontal bars. The top bar is the narrowest and is labeled "Secondary consumers". The middle bar is the widest and is labeled "Producers". The bottom bar is narrower than the middle bar and is labeled "Primary consumers".
- D.  Energy pyramid D consists of three horizontal bars. The top bar is the narrowest and is labeled "Primary consumers". The middle bar is the widest and is labeled "Producers". The bottom bar is narrower than the middle bar and is labeled "Secondary consumers".

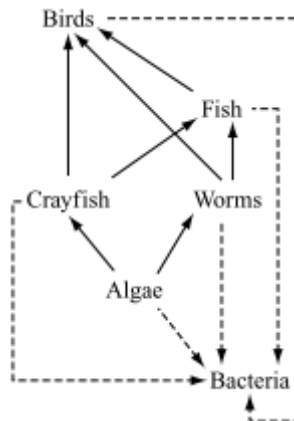
10. Part of a desert food web is diagrammed below.



Which of the following will **most likely** result if all of the primary consumers are removed from this ecosystem?

- A. Prairie rattlesnakes will become herbivores.
- B. Golden eagle and kit fox populations will decrease.
- C. Sagebrush grasshoppers will consume soil bacteria.
- D. Silk grass and sand sagebrush populations will decrease.

11. Part of a marsh food web is shown below.



Which of the following statements correctly describes organisms in this food web?

- A. The birds are producers.
- B. The algae are consumers.
- C. The worms are carnivores.
- D. The bacteria are decomposers.

SC.912.L.17.2 Abiotic Aquatic Factors

1. Jill made the table below during her research on aquatic zones and living organisms.

Characteristics of Aquatic Zones	
Intertidal	Air, sun and water exposure; crashing waves
Neritic	Water depth less than 200 m; lots of sunlight; warm water
Benthic	Very deep water; no light; cold water except near thermal vents that emit heat and chemicals.

Based on Jill's observations, which conclusion could you draw?

- A. Organisms in the intertidal zone must be able to withstand very cold water.
- B. There are no producers in the benthic zone that rely on photosynthesis.
- C. Organisms in the benthic zone must be able to tolerate large amounts of oxygen.
- D. The warm water and abundant sunlight in the neritic zone limits the plankton population.

SC.912.L.17.5 Interdependence & Population

1. Competition between two species occurs when:

- A. Mold grows on a tree that has fallen in the forest
- B. Chipmunks and squirrels eat sunflower seeds in a garden
- C. A crow feeds on the remains of a rabbit killed on the road
- D. A lion stalks, kills and eats an antelope

2. Which statement represents a characteristic of an ecosystem that is *not* likely to sustain itself?

- A. The Sun provides the needed energy.
- B. Energy is transferred from plants to animals.
- C. There are more consumers than producers.
- D. There are interactions between biotic and abiotic factors.

3. When an environment has reached its carrying capacity for a certain population, which of the following is true?

- A. Growth and immigration rate is equal to death and emigration rate.
- B. Growth and immigration rate is greater than death and emigration rate.
- C. Growth and immigration rate is less than death and emigration rate.
- D. Growth rate is exponential.

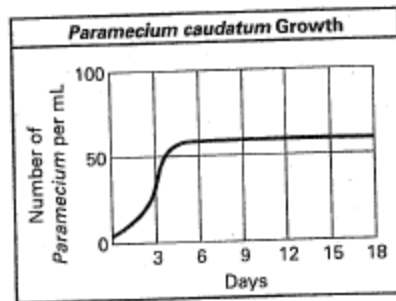
4. The common brushtail possum is a marsupial native to Australia. This possum was introduced to New Zealand where it had no natural predators and had an abundant food supply. Which of these likely occurred a few years after the introduction of this possum to New Zealand?

- A. The possums became extinct.
- B. The possums developed shorter life spans.
- C. The possum population grew to a larger size.
- D. The possum population evolved into a different species.

5. Angel was trying to explain carrying capacity to her mother. Which of the following descriptions is accurate? Carrying capacity is :

- A. the maximum number of individuals that an ecosystem can sustain.
- B. the ability of an environment to accommodate a growing population.
- C. the greatest number of individuals that an area can sustain over the long term.
- D. the maximum number of species that can co-exist in an area.

6. You have been studying population growth of a species of *Paramecium*, a single celled organism for 18 days. Your data are shown in the graph below. Food was occasionally added to the test tube in which the paramecia were grown.



According to the diagram, what is the carrying capacity of the test-tube environment as long as food is added?

- A. about 10 paramecia
- B. about 50 paramecia
- C. about 65 paramecia
- D. about 100 paramecia

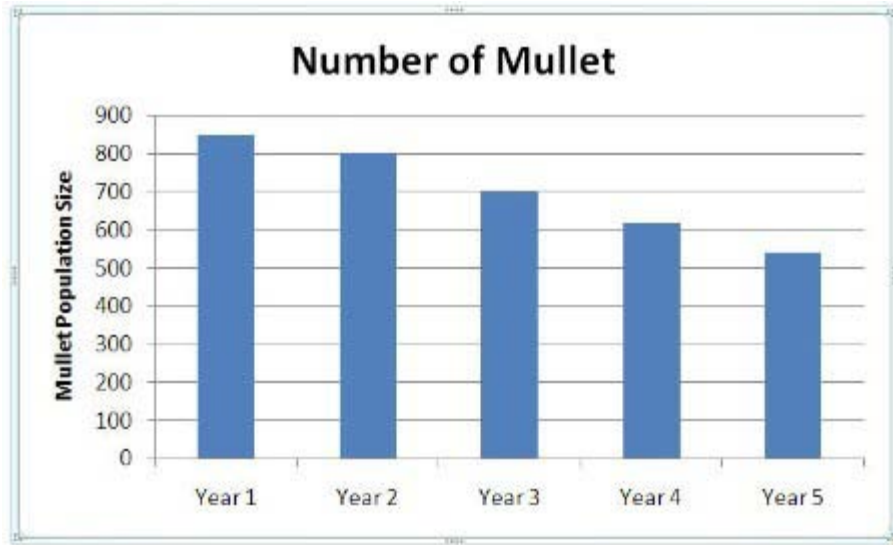
7. Jenn is studying a population of fish found in a pond that has a decreasing carrying capacity. Which of the following factors would **not** decrease the carrying capacity of her fish?

- A. drought
- B. flooding
- C. food shortages
- D. a freeze

8. An animal population decreases from 800 individuals to 600 individuals. Which of the following could explain this change in population size?

- A. The population size of the animal's predator increased.
- B. The emigration rate of the animals from the population decreased.
- C. The number of breeding pairs in the animal's population increased.
- D. The number of species competing with the animal for food decreased.

9. Mullet are local estuarine fish that move in schools and feed on plankton and plant matter. Natural predators of the mullet include spotted sea trout, sharks, pelicans and dolphins. The graph below shows how the number of mullet in an area has changed over time.



Based on the data, one student concludes that a new predator was introduced into the area during this time period. Which of the following is a likely alternate explanation for the change in the mullet population?

- A. mullet prey increased in the area
- B. mullet parasites decreased in the area
- C. the temperature of the area increased
- D. the amount of aquatic plants in the area decreased

10. The pea weevil is a type of insect. The table below shows the average time it takes for pea weevil eggs to hatch at different temperatures.

Temperature (°C)	Average Hatching Time (days)
11	38
14	20
16	16
18	10
22	10
24	7
25	5
27	5
28	7

Based on the data, which of the following conditions would promote the highest population growth rate in pea weevils?

- A. cold springs with temperatures from 11°C to 16°C
- B. moderate summers with temperatures from 25°C to 27°C
- C. heat waves in which the temperature is sustained well above 28°C
- D. overnight frosts after which the temperature warms from 0°C to 11°C

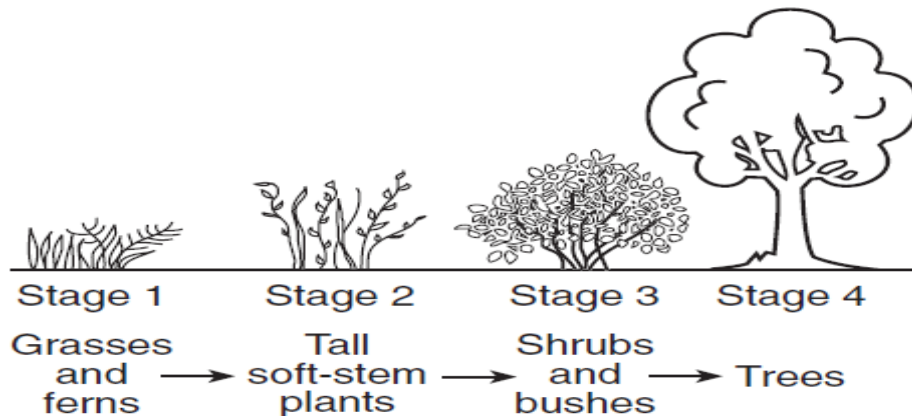
11. On remote islands, immigration and emigration usually do not have a large effect on population sizes. A bird population on a remote island remains at a relatively constant size year after year.

Which of the following **most likely** describes the birthrate and the death rate for this population?

- A. Birthrate and death rate are both zero
- B. Birthrate and death rate are close to equal.
- C. Birthrate is significantly less than death rate.
- D. Birthrate is significantly greater than death rate.

SC.912.L.17.4 Changes in an Ecosystem

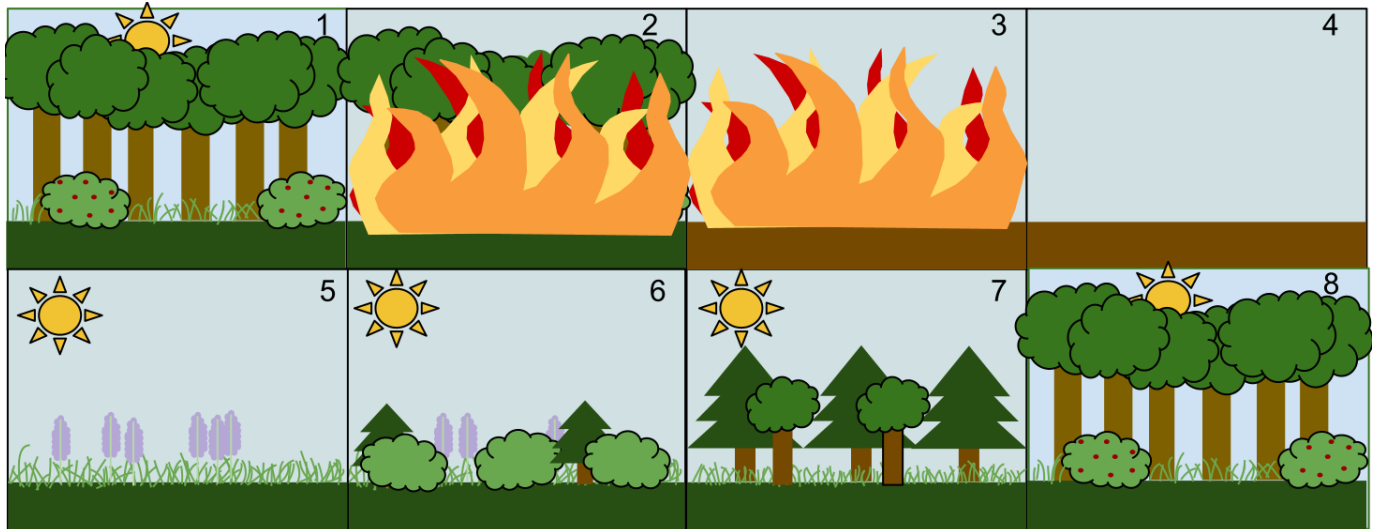
1. Changes in an ecosystem over a long period of time are shown in the diagram below.



These changes will most likely lead to a:

- A. stable ecosystem that can last for many years
- B. loss of heterotrophs that cannot be recovered
- C. long-term rise in environmental temperatures
- D. forest consisting of only producers and decomposers

2. The diagram below shows how an area progresses over time after a forest fire.



What process is illustrated by the diagram in boxes 4-8 after the forest fire?

- A. pioneer speciation
- B. primary succession
- C. secondary succession
- D. ecosystem boundaries

3. A biologist compares how different ecosystems undergo succession. She divides the series of events that happen during primary and secondary succession into three different stages. Which feature might be used to distinguish secondary succession from primary succession?

- A. the lack of pioneer species in the second stage
- B. the presence of pioneer species in the final stage
- C. the presence of trees and large plants in the final stage
- D. the presence of soil and organic matter in the first stage.

4. After a volcano erupts and destroys an ecosystem, a few organisms are able to begin growing from the decaying organic matter left behind. What do we call those organisms that are able to grow in little or no soil that first appear?

- A. adaptors
- B. pioneer species
- C. non-vascular plants
- D. decomposers

SC.912.L.17.20: Human Impact

1. One way that humans could have a positive impact on local environments is to:
 - A. generate waste products as a result of technological advances
 - B. use resources that are renewable
 - C. increase planting large areas of one crop
 - D. increase the use of pesticides

2. Environmentalists are hoping to protect endangered organisms by calling for a reduction in the use of pesticides, because loss of these organisms would:
 - A. increase the mutation rate in plants
 - B. cause pesticides to become more toxic to insects
 - C. reduce biodiversity in various ecosystems
 - D. decrease the space and resources available to other organisms

3. After the Aswan High Dam was built on the Nile River, the rate of parasitic blood-fluke infection doubled in the human population near the dam. As a result of building the dam, the flow of the Nile changed. This changed the habitat, which resulted in an increase in its population of a certain aquatic snail. The snails, which were infected, released larvae of the fluke. These larvae then infected humans. This situation best illustrates that:
 - A. the influence of humans on a natural system is always negative in the long term
 - B. the influence of humans on a natural system can have unpredictable negative impacts
 - C. human alteration of an ecosystem does not need to be studied to avoid ecological disaster
 - D. human alteration of an ecosystem will cause pollution and loss of finite resources

4. One way humans can promote the survival of organisms in an ecosystem is to:
 - A. decrease diversity in plant habitats
 - B. introduce new consumers to control autotrophs
 - C. release extra CO₂ into the atmosphere to help autotrophs
 - D. learn about the interactions of population

5. Some people see the benefit of wind energy as a clean alternative to fossil fuels for energy production. Others believe it is dangerous for migratory birds. These opinions best illustrate that decisions about alternate energy sources:
 - A. will usually favor older methods of energy production over newer methods
 - B. must be made by weighing the risks and costs against the benefits
 - C. must be made by taking into account the present needs of the citizens without looking toward the future
 - D. should be the responsibility of each individual

6. A builder is proposing a new housing development in an area of western Massachusetts. Construction of the housing development will destroy the wetland habitat in the area.

Which of the following would be the **most likely** consequence of the wetland's destruction?

- A. The wetland plant species would disperse to adjacent meadow habitats.
- B. The populations of wetland animals would be unable to survive in that area.
- C. The wetland animal species would survive by interbreeding with non-wetland species.
- D. The populations of wetland plants would evolve to disperse seeds by wind rather than water.

7. New fuels are being produced by converting corn and grasses into compounds containing alcohols that can be broken down for energy in various engines. The purpose of this research is to

- A. reduce the use of nonrenewable resources.
- B. increase the rate of air pollution.
- C. reduce the rate of homeostasis in organisms.
- D. cause a loss of biodiversity in the rain forests.

8. The presence of wastes, such as plastic bags and motor oil, in lakes and streams miles away from developed areas suggests that:

- A. ecosystems are interconnected and human action can alter ecosystem equilibrium.
- B. recycling programs have failed to conserve biotic resources.
- C. natural processes can alter ecosystem stability.
- D. direct harvesting practices have led to irreversible destruction of ecosystems.

9. DDT and other pesticides used over 50 years ago are still affecting the environment today. Scientists have found these substances in recent glacier runoff. Glacier runoff occurs during the summer, when precipitation that has fallen on glaciers during the winter is released. Ice layers from existing glaciers have been analyzed. The results of this analysis show that the concentrations of DDT and other pesticides were highest about 10 years after the use of these substances was banned.

This information shows that:

- A. DDT and other pesticides cause glacier runoff during the summer.
- B. it takes humans over 50 years to analyze a glacier.
- C. precipitation helps to break down pesticides.
- D. the decision of one human generation may have an impact on future generations.

10. When fertilizers run off farmland into streams and ponds, the nitrogen content of the water increases. This can lead to rapid growth of algae in a process called eutrophication. How can this process affect other organisms in the water?

- A. Oxygen is used up as algae is decomposed, reducing the amount available to other organisms.
- B. The water becomes better able to support aerobic organisms.
- C. The algae provide food for fishes and other organisms, leading to decreased algae populations.
- D. The extra nitrogen provides additional food for the other organisms, increasing their population.

11. Whaling was a very profitable profession until whale populations crashed. The global community came together to enact a ban on whaling. However, Japan and Norway have not agreed to stop whaling. Which of the following is the most likely consequence of their decision?

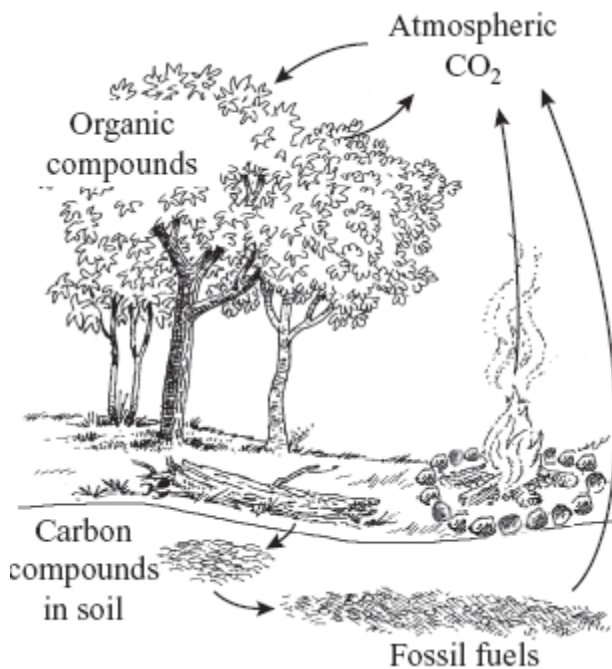
- A. The whale populations are bouncing back very successfully and are unaffected by Japan and Norway continuing to whale.
- B. The whale populations are not rebounding as quickly as they might if all of the countries agreed not to hunt whales.
- C. The whale populations have mutated into new kinds of organisms.
- D. The whales are getting better at avoiding capture.

SC.912.E.7.1: Carbon and Water Cycles

1. Leaves fall from deciduous trees in autumn. The carbon in these leaves is returned to the atmosphere through which of the following processes?

- A. condensation
- B. decomposition
- C. photosynthesis
- D. transpiration

The diagram below shows part of the carbon cycle.



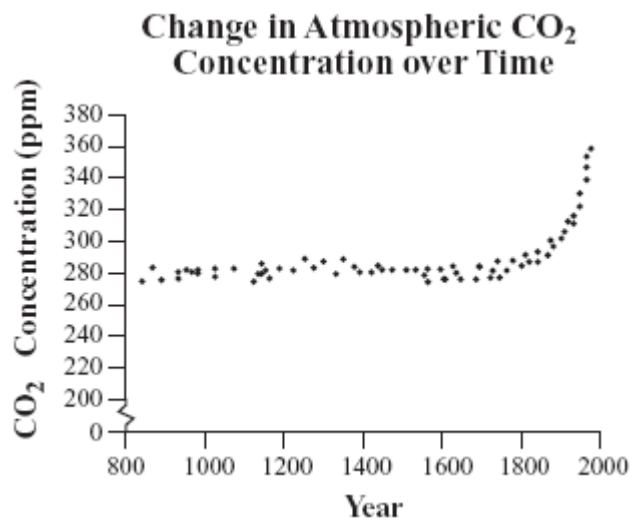
If many trees are removed from a forest by logging, what is the most immediate effect on the carbon cycle in that forest?

- A. increase in the rates of decomposition
- B. increase in the rates of atmospheric carbon dioxide
- C. decreased combustion of fossil fuel
- D. increase production of organic compounds

3. The water cycle would **not** occur if which of the following were missing?

- A. bacteria
- B. autotrophs
- C. carbon dioxide
- D. solar energy

4. A graph of atmospheric carbon dioxide concentration over time is shown below.



Scientists are investigating the cause of the large increase in atmospheric carbon dioxide concentration since about 1800. Which of the following provides the **best** explanation for the increase?

- A. eruptions of large volcanoes
- B. use of fossil fuels by humans
- C. natural fluctuations of climate
- D. photosynthesis by phytoplankton