Lesson 2. 1 **Living Things and Their Environment**

This lesson will help you practice working with concepts related to interactions between living organisms and their environment. Use it with core lesson 2. 1 Living Things and Their Environment to reinforce and apply your knowledge.

Key Concept

Organisms interact with the living and nonliving parts of their environment. Climate and other environmental factors influence how populations and communities develop around the world.

Core Skills & Practices

- **Analyze Relationships between Sources**
- **Make a Prediction Based On Data or Evidence**

The Living Environment

Interactions among organisms and their environment include both the living (biotic) and nonliving (abiotic) parts of the environment.

Directions: Answer the questions below.

1. What is one example of an abiotic factor in a marine environment?

A. fish that eat algae

B. shift in tides and its timing

C. reproduction in microorganisms

D. competition among sharks for food

2. In a small forest ecosystem, could you find two species of lizards living in the same population? Why or why not?

_____

_____

_____

_____

Directions: Use the passage below to answer questions 3-4.

Competition for limited resources is an important relationship among organisms in an ecosystem. For example, in a pond both bass and ducks eat small fish. The greater the number of fish eaten by ducks, the less food for the bass. Each animal has more than one source of food, so this competition is not likely to lead to any complete population starving. However, competition, mainly for food, limits the size of each population. In a stable ecosystem, each population stays about the same size. The number of each species that dies is balanced by the number of newborns that survive.

3. What would be a sign of the ecosystem becoming unstable?

A. Environmental conditions change seasonally.

B. The bass and ducks compete for food.

C. The bass population grows and the duck population declines.

D. There are abundant small fish for predators.

4. Using the description given, predict what might happen to the niches of ducks and bass if the populations of small fishes decreased.

_____

_____

_____

_____

Directions: Answer the questions below.

5. Sort the levels of ecology to match each research question. Complete the table by writing the level of ecology in the appropriate space.

population	community	ecosystem

Research Question	Level of Ecology Studied
How does hurricane damage in a wetland affect the food chain there?	
How do birds in a flock behave to prevent predators from taking their eggs?	
How does the addition of a bass to a pond affect the populations of other fish species?	

6. Within a coral reef, several species of fish live in the same area. Some hide among corals and filter passing plankton, others actively chase and eat smaller fish, and still others nibble on the coral itself. Based on this evidence of these species' differences, what do you predict is the main cause of these various "occupations" represented in the coral reef ecosystem?

A. how food resources can be limited

B. how population sizes can be affected

C. how adaptations help determine niches

D. how environmental conditions cause crowding

Biomes

Biomes are large regions defined by climate characteristics and contain similar organisms adapted to those conditions.

Directions: Answer the questions below.

7. A still, shallow pond supports cattails and grasses at its edge, and fishes, frogs, and insects within. A sunlit coral reef includes algae, fishes, crabs, and corals. What do these two freshwater and marine biomes have in common?

A. Each supports plant life.

B. Each is affected by tides.

C. Both are primarily low-oxygen environments.

D. Both support life only at the surface.

8. Biomes vary in the types and numbers of organisms that they support Some biomes have environmental conditions that are more severe than others, sustaining only organisms particularly adapted to those conditions, whereas other biomes have environmental conditions that are "hospitable" enough to sustain a variety of organisms. Which two biomes support similar levels of biological diversity?

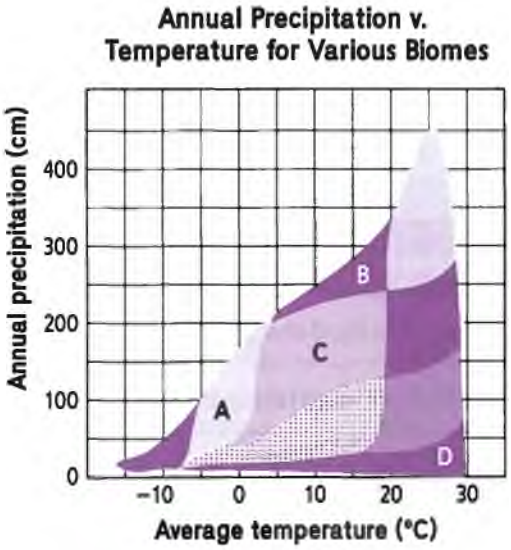
A. desert and coral reef

B. shallow pond and deep ocean

C. tundra and tropical rain forest

D. tropical rain forest and coral reef

Directions: Use the diagram to answer questions 9-11.



9. The labeled biome that is both coldest and driest is_____ .

10. Based on the diagram and your general knowledge of biomes, predict which list correctly orders four land biomes from driest to wettest

A. tundra—►deciduous forest —►desert —►grassland

B. tundra—► grassland—► deciduous forest—► temperate rain forest

C. desert —► temperate rain forest —► tropical rain forest —► deciduous forest

D. temperate rain forest —► grassland —► tundra —► tropical rain forest

11. Which region of the diagram represents a desert biome?

A. Region A

B. Region B

C. Region C

D. Region D

Test-Taking Tip

In a computer-based test environment, you may be asked to click on a region of a graph to select the correct answer. When completing these types of hot spot questions, keep in mind that the location of the identified point in the diagram or graph is critical to your answer choice. To narrow down your range of answers, first determine what makes that spot different from other locations on the figure. Eliminate answers that would obviously not meet these criteria.

This lesson will help you practice working with concepts related to how organisms move energy and matter through ecosystems. Use it with core lesson 2. 2 Movement of Energy and Matter to reinforce and apply your knowledge.

Key Concept

Organisms move energy and matter through ecosystems. Energy is lost as it passes through a community of organisms, but matter is recycled and used over and over again.

Core Skills & Practices

* **Identify and Refine Hypotheses for Scientific Investigations**
* **Analyze Relationships Among Terms**

Energy Flow in an Ecosystem

Energy is conserved as it moves through an ecosystem: Energy changes in form as some is absorbed by organisms and some is released as heat

Directions: Answer the questions below.

1. Which statement correctly describes all producers in any food web?

A. Producers require the Sun's energy to produce organic molecules.

B. Producers provide energy for all other organisms in a food web, except decomposers.

C. Producers are a direct source of organic compounds for herbivores and omnivores.

D. Producers make up the smallest organisms in the food web.

2. How do decomposers link the flow of energy in an ecosystem to the cycling of matter?

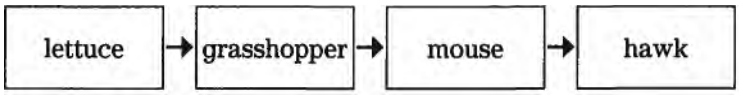
A. Decomposers cause other organisms to lose energy in the form of heat.

B. Decomposers limit the contribution of nutrients from other organisms.

C. Decomposers produce oxygen when they break down other organisms.

D. Decomposers release nutrients from dead organisms into the environment.

Directions: Use the food chain diagram below to answer questions 3-4.



3. Which organism shown is a first-order heterotroph?

A. hawk

B. mouse

C. lettuce

D. grasshopper

4. What might a food web tell you about this community of organisms that this food chain does not? Provide specific examples in your answer.

Directions: Use the passage below to answer questions 5-6.

At the turn of the century, ranchers moved onto the grassy Kaibab Plateau in northern Arizona. They were attracted by the fine grazing areas and large numbers of deer for hunting. Fearing that the mountain lion, another inhabitant of the region, would prey on the cattle and deer, the ranchers waged a campaign to eliminate the cat from the plateau. They were successful in their efforts, and mountain lions disappeared within a few years. However, the success of the ranchers at eliminating mountain lions produced terrible ecological results. Increased numbers of deer, along with herds of grazing cattle, stripped the land of all grasses. Soon, heavy rains caused major erosion, and the land was reduced to a fraction of its usefulness. This problem has occurred repeatedly where humans have changed an ecosystem without considering the possible consequences.

5. What did the ranchers do that initially disrupted the food web in the Kaibab Plateau ecosystem?

A. reduced the population of secondary consumers

B. brought in cattle, stimulating producers

C. upended the energy pyramid by hunting omnivores

D. eliminated habitat needed by autotrophs

6. How can the effects on the Kaibab Plateau ecosystem be described in terms of components of the food web?

A. Autotrophs increased, which increased heterotrophs.

B. Second-order heterotrophs decreased, which increased first-order heterotrophs.

C. First-order heterotrophs decreased, which decreased second-order heterotrophs.

D. First-order heterotrophs increased, which decreased autotrophs.

Cycles of Matter

Water and nutrients are constantly recycled within ecosystems as they move through various biogeochemical cycles.

Directions: Answer the questions below.

7. Students participating in a biology field course are attempting to measure and graph the oxygen cycle in a local pond ecosystem over time. What change might they observe following the deaths of half the plants surrounding the pond from a fungal disease?

A. a sudden release of oxygen to the atmosphere

B. a decline in oxygen released to the atmosphere

C. an increase in oxygen buried as organic matter

D. an increase in carbon dioxide produced by heterotrophs

8. During one spring, the local newspaper reports that a flock of Canada geese has settled and is raising goslings at the pond in a town park. That summer, the newspaper reports that the pond is covered with algae and smells like dead fish. Which hypothesis best explains the connection between these two events?

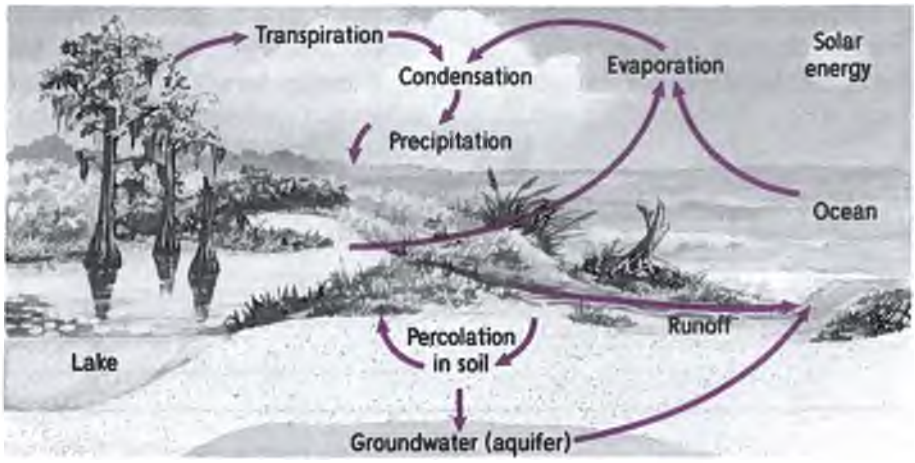
A. The geese disrupted the water cycle by decreasing runoff.

B. The geese avoided algae as a food source.

C. The geese contributed excessive carbon to the carbon cycle.

D. The geese contributed nitrogen that caused eutrophication in the pond.

Directions: Use the diagram below to answer question 9.



9. A developer receives permits allowing him to cut down the trees in the pictured swamp and fill in part of the lake. Using the table below, sort out how these changes might directly alter the cycling of matter in this ecosystem. Complete the table by writing the affected process next to the correct effect of the alteration.

Effect of ecosystem alteration	Process affected
Loss of trees	
Loss of lake	
Decrease in percolation	
Decrease in evaporation	

Decreased groundwater	Decreased runoff
Decreased transpiration	Decreased condensation

Test-Taking Tip

During an exam, it often helps to take a momentary break, shut your eyes, and take a few deep breaths. It will help you clear your head and stay fresh during the exam session. Just two or three 30-second breaks can be very beneficial.

This lesson will help you practice working with concepts related to interactions among populations. Use it with core lesson 2. 3 Interactions Among Populations to reinforce and apply your knowledge.

Key Concept

Many factors control the growth of a population in an area. The maximum size of a population that a specific environment can sustain over time can be influenced by interactions among populations.

Core Skills & Practices

- **Describe a Data Set Statistically**
- **Evaluate Reasoning**

Factors that Affect Population Size

Limiting factors reduce the growth rate of a population.

Directions: Read the passage below. Then choose the option that correctly completes each sentence.

1. Vanessa is studying the growth of a population of grasshoppers in an enclosure. She has identified lack of food, lack of [1 Select . . .] , and cold temperatures as limiting factors. The more limiting factors she removes from the environment, the faster the population will [2 Select . . .] .

[1 Select . . .]

A. time

B. water

C. offspring

D. predators

[2 Select . . .]

A. stabilize

B. increase

C. fluctuate

D. decrease

Test-Taking Tip

When answering a drop-down question, try to read the passage and think of the answer on your own before looking at the answer choices. This will help you quickly eliminate answer choices that do not fit the context of the passage.

Directions: Answer the questions below.

2. Cougars are known predators of deer. Relatively soon after cougar hunting was legalized, the deer population in Sherman Forest spiked. A decade later scientists noted the deer population was declining due to widespread starvation. In this scenario, _____ became a limiting factor. Explain why.

_____

_____

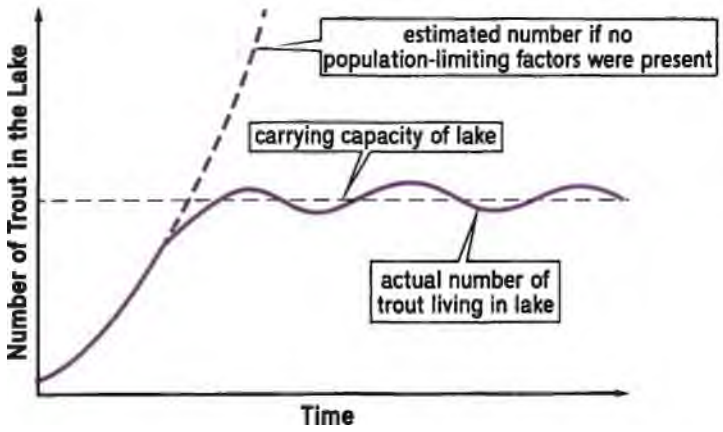
_____

3. Mikhela has been tracking the moose population in a state park. According to the following figures, the estimated carrying capacity for this stable moose population in the park is _____.

	Year 35	Year 36	Year 37	Year 38	Year 39
Moose population	138	152	145	144	145

Directions: Use the graph below to answer questions 4-6.

Trout Population in a Lake



4. After the carrying capacity is reached, what will be true about the trout population in the lake?

A. The average number of trout will remain stable over time.

B. The average number of trout will slowly increase over time.

C. The average number of trout will slowly decrease over time.

D. The average number of trout will remain stable but for only a short time.

5. Which of the following would least likely be classified as a population-limiting factor for the trout?

A. water pollution in the lake

B. the presence of other species in the lake that feed on trout eggs

C. bacteria in the lake that cause diseases in fish

D. the presence of many insect species along the shore of the lake

6. Which of the following can you infer to be true about the trout population if there were no population-limiting factors?

A. It would slowly decrease over time.

B. It would remain relatively stable over time.

C. It would show an exponential increase over time.

D. It would reach a threshold and then result in extinction.

Symbiosis

A close relationship between individuals of two or more species is called symbiosis.

Directions: Use the passage below to answer questions 7-8.

When animals and plants live together in the same environment, such as a forest or a lake, special nutritional relationships develop among many of the different organisms. In a predator-prey relationship, one organism kills and eats a second organism. In a parasitic relationship, one organism takes nutrients from the living body of another organism and in doing so may harm but does not immediately kill the other organism. In a mutualistic relationship, organisms form relationships that benefit all of the organisms. In a commensal relationship, one organism benefits from a second organism while the second organism neither benefits nor is harmed.

7. As uninvited guests, small beetles often live in the nest of an ant colony, helping themselves to food supplies built up by the ants. During a season when food resources are plentiful, the portion of food taken by the beetles is not missed. How would you classify this relationship?

A. parasitic

B. mutualistic

C. commensal

D. predator-prey

8. A fungus causes the disease chestnut blight in the American chestnut tree. This fungus takes nutrients from the tree and damages plant tissue on any part of the tree on which it grows. Eventually, chestnut trees usually die from this disease. How do you classify the relationship of the chestnut-blight fungus to the chestnut tree?

A. parasitic

B. mutualistic

C. commensal

D. predator-prey

Predator-Prey Relationships

Predation is a type of symbiosis where one organism kills and eats another organism.

Directions: Answer the questions below.

9. A biologist tracking the population of hawks and mice has noted that as the population of hawks increased, the population of mice tapered off and began to decline. What is the most likely cause for this decrease?

A. The growing hawk population is increasingly killing more mice.

B. The mice population has contracted a disease and is dying off.

C. The ecosystem has become polluted and both populations will decline.

D. The food sources for mice are decreasing at an exponential rate.

10. Camouflage is a widely seen method in nature by which an organism blends into its background environment. An organism may exhibit both the color and shape characteristics of its surroundings. Which of the following types of organisms stands to benefit **most** from camouflage?

A. prey

B. host

C. parasite

D. pollinator

This lesson will help you practice working with concepts related to disruptions to ecosystems and the consequences or impact of these disruptions. Use it with core lesson 2. 4 Disruptions to Ecosystems to reinforce and apply your knowledge.

Key Concept

Ecosystems can be disrupted by both natural events and human activities. Disruptions can have a significant impact on organisms and the entire ecosystem.

Core Skills & Practices

- **Reason From Data or Evidence to a Conclusion**
- **Distinguish Among Reasoned Judgments**

Natural Disruptions to Ecosystems

Natural hazards that disrupt ecosystems include volcanic eruptions, wildfires, and flooding.

Directions: Use the passage below to answer questions 1-2.

On the morning of May 18, 1980, an earthquake under Mount St. Helens started a tremendous volcanic eruption. The north face of the mountain slid away in a huge avalanche, releasing a blast of superheated, rock-filled gas that ripped up the trees in its path. By the afternoon, slower, hotter flows of gas and rock had destroyed the trees and killed all living organisms in the soil. Mature forests were turned into ash-covered wasteland.

Since then, hardy plants have reappeared in the ash field. The plants attract herbivores that drop seeds from other plants in their dung. More than three decades after the eruption, the forest is beginning to regrow.

1. How were new plants introduced into the ecosystem of Mount St. Helens after the volcanic eruption?

A. through wind-blown seeds

B. in the ash of burned vegetation

C. by animals returning to the area

D. with the flows of heated gas and rock

2. As used in the passage above, the word avalanche means a(n)_____.

A. lava flow

B. explosion

C. large snow slide

D. massive rock slide

Directions: Answer the question below.

3. Areas along a river that experience regular flooding are called floodplains. Why might floodplains be productive land for growing crops?

A. Flooding can improve the pH balance of the water used to irrigate crops.

B. Flooding can provide a healthy layer of standing water to enrich the soil.

C. Flooding can clear the land of animals and invasive plants that threaten crops.

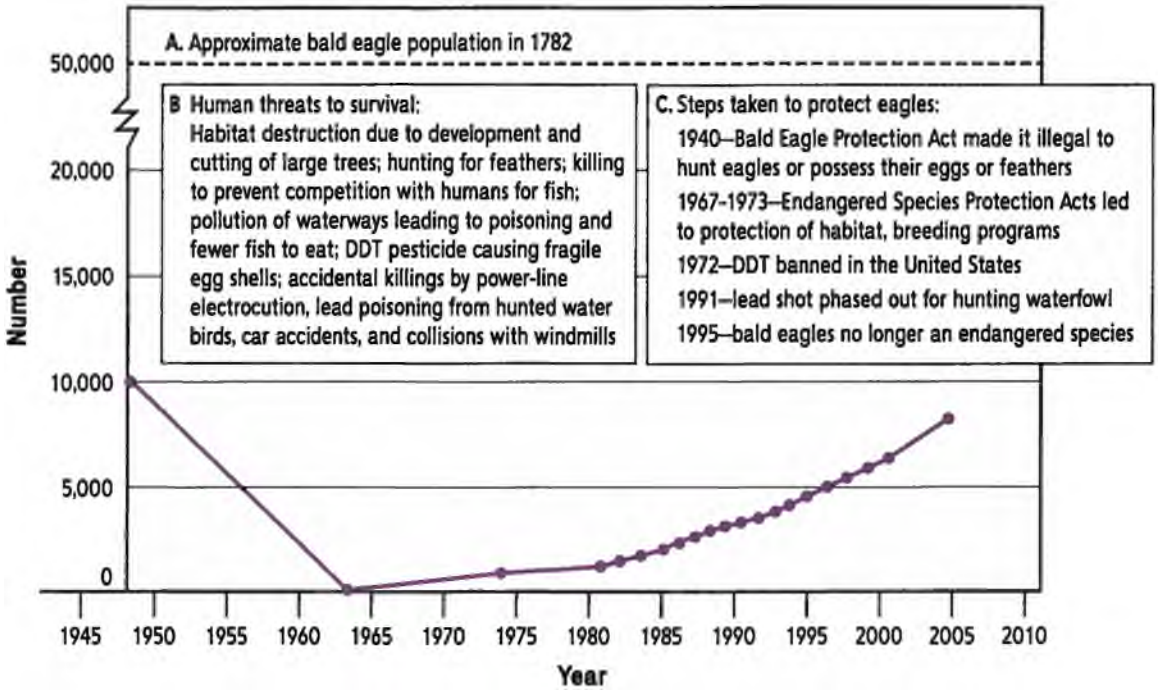
D. Flooding can enrich depleted soil by depositing a layer of nutrient-rich sediment.

Human Effects on Ecosystems

Modern humans can impact the natural world significantly through habitat destruction and increased pollution. These effects of human activity alter ecosystems, contribute to global warming, and threaten sensitive species with extinction.

Directions: Use the information below to answer questions 4-6.

Nesting Pairs of Bald Eagles in the Continental United States



4. The bald eagle is a large bird of prey that lives near water in every U. S. state except Hawaii. Based on the graph above, why was lead shot phased out in 1991?

A. Hunters using lead shot would often mistake eagles for waterfowl.

B. Lead shots that missed waterfowl were hitting eagles instead.

C. Lead shot was polluting the waterways used by eagles and waterfowl.

D. Eagles were being poisoned from eating waterfowl killed with lead shot.

5. Based on the evidence above, form a conclusion about how the ban on DDT appears to have affected bald eagle populations.

_____

_____

_____

6. Which sequence best describes the link between fossil fuels and the loss of habitats along ocean shorelines?

A. rise in global temperatures —▶ burning of fossil fuels —▶ release of carbon dioxide into the atmosphere —▶ melting of polar ice caps —▶ rise in sea levels

B. burning of fossil fuels —▶ release of carbon dioxide into the atmosphere —▶ rise in global temperatures —▶ melting of polar ice caps —▶ rise in sea levels

C. release of carbon dioxide into the atmosphere —▶ rise in sea levels —▶ melting of polar ice caps —▶ burning of fossil fuels —▶ rise in global temperatures

D. burning of fossil fuels —▶ melting of polar ice caps —▶ rise in sea levels —▶ release of carbon dioxide into the atmosphere—▶ rise in global temperatures

Directions: Answer the questions below.

7. Why have human biological control efforts often been unsuccessful?

A. Natural enemies destroy the newly introduced organism in the new environment.

B. People have not understood how the change will affect the entire ecosystem.

C. The newly introduced organism has been unable to adapt to the environment.

D. People have mis-identified the problem that they are trying to solve

8. Which statement best explains how overhunting harms ecosystems?

A. It weakens one species and permits the introduction of another, which may negatively affect the ecosystem.

B. The removal of one species from an ecosystem causes changes in the food web and disrupts the entire ecosystem.

C. When one animal is removed, it becomes necessary to find a replacement that will return balance to the ecosystem.

D. By reducing a particular animal population, it endangers a valuable source of food and other materials required by humans.

Directions: Use the passage below to answer questions 9-11.

Wolves were reintroduced to Yellowstone National Park in 1995. Through hunting, wolves cut the elk population in half. With fewer elk, more cottonwood and aspen trees grew. The trees fed beaver and provided homes for birds. By controlling the number of elk, the wolves made the forest more diverse.

9. Explain the meaning of "biodiversity. " Then explain how the elk were affecting the biodiversity within Yellowstone National Park before the wolves were reintroduced.

_____

_____

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10. According to the passage, wolves _____ the biodiversity of Yellowstone National Park.

11. Based on information in the passage, which statement is most likely true?

A. Reintroducing wolves to Yellowstone National Park may restore a healthy equilibrium to the ecosystem.

B. Removing the wolves from Yellowstone National Park brought about beneficial changes to the ecosystem.

C. The biodiversity within the park will continue to increase as wolves further reduce the elk population.

D. The natural balance between organisms and their environment will prevent the wolves within the park from over-populating

Test-Taking Tip

When completing a multiple choice question on a test, it is generally best to go with your first answer selection. When a person changes an answer, the changed answer is often not correct.