**Content Vocabulary**

**Ecosystems and Biomes**

**Directions:** Use the clues and the terms listed below to complete the puzzle. **Note:** There is no empty square in the puzzle between the words of two-word terms. You may need to change a term to its plural form.

<table>
<thead>
<tr>
<th>abiotic factor</th>
<th>atmosphere</th>
<th>biotic factor</th>
<th>community</th>
<th>ecosystem</th>
<th>population</th>
<th>succession</th>
</tr>
</thead>
</table>

1. water, light, and temperature, for example
2. the gradual change from one community to another community in an area
3. all the members of a species in one place
4. a parrot and a fallen tree, for example
5. forest, desert, or tundra, for example
6. includes water vapor, oxygen, carbon dioxide, nitrogen and other gases—on Earth
7. all the living and nonliving things in one place
8. includes water vapor, oxygen, carbon dioxide, nitrogen and other gases—on Earth

**CLUES**

**Across**
1. water, light, and temperature, for example
5. the gradual change from one community to another community in an area
7. all the living and nonliving things in one place
8. includes water vapor, oxygen, carbon dioxide, nitrogen and other gases—on Earth

**Down**
2. all the populations living in an ecosystem at the same time
3. all the members of a species in one place
4. a parrot and a fallen tree, for example
6. forest, desert, or tundra, for example

**Key Concept Builder**

**Ecosystems and Biomes**

**Key Concept** What are ecosystems?

**Directions:** Answer each question or respond to each statement on the lines provided.

1. What makes up an ecosystem?

2. Give an example of an organism interacting with a nonliving part of an ecosystem.

**Directions:** Write **B** on the line before each example that is a biotic factor. Write **A** on the line before each example that is an abiotic factor. Then answer each question below.

- 3. water
- 4. temperature
- 5. a fallen tree
- 6. an ant
- 7. atmosphere
- 8. light
- 9. a dead rabbit
- 10. a deer
- 11. soil
- 12. a plant

13. Based on your answers above:

   a. how would you define **biotic** factor?
   b. how would you define **abiotic** factor?
Key Concept Builder

Ecosystems and Biomes

Key Concept  What are ecosystems?

Directions: Complete the Venn diagram by writing features of populations on the left and communities on the right. Write what they have in common in the center.

1. Populations
2. Both
3. Communities

Abiotic Factors

4. Explain how water helps determine which organisms live in an ecosystem.

5. Give an example of two organisms that live in ecosystems with different temperatures.

6. List four gases in the atmosphere that organisms need.

Directions: Respond to each statement on the lines provided.

9. Based on your check marks above, how is a biome different from an ecosystem?

10. List four major terrestrial biomes.

11. How is a marine biome different from a freshwater biome?
Key Concept Builder

Ecosystems and Biomes

Key Concept  What happens when environments change?

Directions: Respond to each statement on the lines or in the space provided.

1. List at least three natural processes that can cause changes in an environment.

2. Describe some ways that human actions can cause changes in an environment.

3. Describe a positive effect and a negative effect that changes can have on an ecosystem.

4. Draw a simple picture of a forested mountain before a volcanic eruption, just after a volcanic eruption, and many years later.

   a. b. c.

5. Describe the changes to the environment in each of your drawings.

Enrichment

Everglades National Park is one of the most unusual ecosystems in the United States. It is an International Biosphere Reserve and a Wetland of International Importance.

But a growing human population and demand for space have harmed the Everglades. Since the 1950s, this fragile ecosystem has experienced a sharp decline in certain wildlife populations.

River of Grass

The Everglades is a shallow river system that flows into the Gulf of Mexico. Before the 1950s, the Everglades got its water from the rivers and lakes around Orlando, Florida, that emptied into the Kissimmee River. The river flowed south into Lake Okeechobee before spreading across flat, open land. The sheet of slow-moving water was about 80 km wide, but only a few centimeters deep. Often called the river of grass, it was a thriving ecosystem rich with crab, fish, alligators, and millions of wading birds. At one point, the Everglades was home to an estimated 2.5 million wading birds. But by the mid-1900s, their numbers began decreasing dramatically.

Draining the Everglades

In the 1950s and 1960s, a series of canals and levees were built near the Everglades to prevent flooding and to drain large areas for farming and development. Billions of liters of water were pumped into the Atlantic Ocean and the Gulf of Mexico. These actions severely disrupted the Everglades ecosystem. Less water meant fewer nutrients to support the plants and animals in the park.

The changes in water flow also increased the salinity of the water. Many aquatic plants died. Other species, such as marsh killifish and sheepshead minnow, could tolerate the salty water. But they could not live without the food and shelter that was once provided by the plants.

As the fish population decreased, the wading birds moved on to better feeding grounds. The birds were a source of food to alligators and other animals in the park. These larger predators suffered as well.

Hope for the Everglades

In the 1990s, record rains restored much of the flow of freshwater to the Everglades. Water levels in the park were close to normal. Studies confirmed that many species had returned to the park, including aquatic plants, fish, crabs, and spiders. But the population of wading birds still remained relatively low. Scientists have determined that some of the birds are nesting farther from the coast.

Diverse Ecosystem

Applying Critical-Thinking Skills

Directions: Respond to each statement.

1. Apply  Scientists often state that a change in one part of an ecosystem affects all other parts. Use examples from the Everglades ecosystem to support this statement.

2. Hypothesize why wading birds are not flocking back to the Everglades.
Populations and Communities

1. Factors that can limit the growth of a population include water, space, and food.

2. A population never reaches its potential growth in perfect conditions with no limiting factors.

3. Instead, limiting factors cause a population to reach the largest number of individuals of one species that an ecosystem can support over time.

4. Mutualism, parasitism, and commensalism are examples of different species living together in a close relationship over a long period of time.

5. Different species live in different physical places.

6. They also have differences in their particular ways of surviving and obtaining resources.

1. Limiting factors restrict the size of populations.
   How would the amount of water and food in an area act as limiting factors?

2. A population’s density is the number of organisms in a population relative to the amount of space.
   How can population density be a limiting factor?

3. Populations and communities are parts of ecosystems.
   How are populations and communities related?

4. A symbiotic relationship occurs when two different species live together in a close relationship for a long time.
   What are three types of symbiotic relationships? What effect does each type of relationship have on the two species involved?
### Populations and Communities

**Key Concept** How do individuals and groups of organisms interact?

**Directions:** Complete this table by writing what happens to the population size on the lines provided.

<table>
<thead>
<tr>
<th>Factor That Changes a Fish Population</th>
<th>Does the population size increase, decrease, or stay the same?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fish are eaten by other organisms.</td>
<td>likely decrease</td>
</tr>
<tr>
<td>2. Fish swim to another location.</td>
<td>stay the same</td>
</tr>
<tr>
<td>3. A large number of fish eggs hatch.</td>
<td>likely increase</td>
</tr>
<tr>
<td>4. Fish die.</td>
<td>likely decrease</td>
</tr>
<tr>
<td>5. Fish are added to the lake.</td>
<td>likely increase</td>
</tr>
<tr>
<td>6. More food is available.</td>
<td>likely increase</td>
</tr>
</tbody>
</table>

**Directions:** Respond to each statement on the lines provided.

7. **Explain** what population density is in your own words.

8. Give an example of an area of your school that has a high population density and an area that has a low population density.

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**Question**

<table>
<thead>
<tr>
<th>Question</th>
<th>Biotic Potential</th>
<th>Carrying Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is it?</td>
<td>6.</td>
<td>7.</td>
</tr>
<tr>
<td>Does a population reach it? Explain why or why not.</td>
<td>8.</td>
<td>9.</td>
</tr>
<tr>
<td>Can it change? Explain why or why not.</td>
<td>10.</td>
<td>11.</td>
</tr>
</tbody>
</table>
**Interactions of Living Things**

**Populations and Communities**

**Key Concept:** What are some examples of symbiotic relationships?

**Directions:** Complete this table by writing how populations might interact with other populations in a pond community.

<table>
<thead>
<tr>
<th>Populations in a Pond Community</th>
<th>How They Interact with Other Populations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cattails and other plants</td>
<td></td>
</tr>
<tr>
<td>2. Different populations of insects</td>
<td></td>
</tr>
<tr>
<td>3. Different populations of fish</td>
<td></td>
</tr>
<tr>
<td>4. A population of ducks</td>
<td></td>
</tr>
<tr>
<td>5. A population of turtles</td>
<td></td>
</tr>
</tbody>
</table>

**Directions:** Fill in the chart to compare a habitat and a niche.

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Niche</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. What is it?</td>
<td>7. What is it?</td>
</tr>
<tr>
<td>8. In a community, which populations share the habitat?</td>
<td>9. In a community, which populations share a niche?</td>
</tr>
</tbody>
</table>

**Key Concept Builder**

**LESSON 2**

**Populations and Communities**

**Key Concept:** What are some examples of symbiotic relationships?

**Directions:** Complete this table by writing the definition and an example of each type of symbiotic relationship.

<table>
<thead>
<tr>
<th>Type of Symbiotic Relationship</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Mutualism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Parasitism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Commensalism</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key Concept Builder**

**LESSON 2**

**Populations and Communities**

**Key Concept:** What are some examples of symbiotic relationships?

**Directions:** Respond to the statement below.

1. **Define** symbiotic relationship.
Word-Meaning Activity: Matching

Directions: Study the terms listed below. On the line before each definition, write the letter of the term that matches it correctly.

A. abiotic factors n. nonliving parts of an ecosystem
B. biome n. a geographic area that contains ecosystems with biotic and abiotic features
C. ecosystem n. organisms and the area where they live
D. habitat n. place where an organism lives
E. niche n. the unique way an organism survives in its habitat
F. organism n. any living thing
G. species n. group of organisms that has similar characteristics and that interbreed successfully

1. a bacterium, a spider, or a tree
2. blue whales or sugar maples
3. a marsh and the organisms that live there
4. temperature, water, air, and other nonliving things in an ecosystem
5. desert, tundra, or forest
6. the wetland area where a beaver lives
7. A turtle eats fish and plants in the pond where it lives.

Language-Usage Activity: Using Prepositions

Prepositions are usually small but necessary words in English. They can express direction, location, possession, and spatial relationship. Below are examples of prepositions and the types of information that they express.

direction: to, toward, from, at, through
location: in, inside, into, at, by, near, nearby
possession: of
spatial relationship: above, below, before, behind, under, underneath

Directions: On each line, write the preposition that correctly completes each sentence: above, from, at, in, of, to.

1. Abiotic factors determine which organisms can live ___________ an ecosystem.
2. Photosynthesis is the main pathway by which energy and carbon enter the web ___________ life.
3. Consumers eat other organisms and gain energy ___________ them.
4. Each level of an energy pyramid has a greater amount of energy than the level ___________ it.
5. Producers are located ___________ the base of an energy pyramid.
6. A food chain shows one path of energy flowing from the environment ___________ organisms.
Lesson 3

Energy and Matter

Directions: Use your textbook to answer each question.

1. The Sun is the source of all energy in ecosystems. How does this energy enter ecosystem food chains?

2. Producers are an important category of species in all ecosystems. How would ecosystems change if producers were removed?

3. Food chains and food webs model energy flow in an ecosystem. How is a food chain different from a food web?

4. An energy pyramid shows the amount of energy available at each step in a food chain. How does an energy pyramid show how the amount of available food energy changes at different levels?

Key Concept Builder

Energy and Matter

Key Concept: How does energy move in ecosystems?

Directions: Answer each question or respond to each statement on the lines provided.

1. What is the source of almost all energy on Earth?

Directions: Complete the Venn diagram by describing photosynthesis on the left and chemosynthesis on the right. Write what they have in common in the center.

2. Photosynthesis

3. Both

4. Chemosynthesis

Directions: Complete this chart by writing an example of each type of organism and its energy source in the spaces provided.

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Example</th>
<th>Energy Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producers that use photosynthesis</td>
<td>5.</td>
<td>6.</td>
</tr>
<tr>
<td>Producers that use chemosynthesis</td>
<td>7.</td>
<td>8.</td>
</tr>
<tr>
<td>Consumers in general</td>
<td>9.</td>
<td>10.</td>
</tr>
<tr>
<td>Herbivores</td>
<td>11.</td>
<td>12.</td>
</tr>
<tr>
<td>Omnivores</td>
<td>15.</td>
<td>16.</td>
</tr>
<tr>
<td>Detritivores</td>
<td>17.</td>
<td>18.</td>
</tr>
</tbody>
</table>
**Key Concept Builder**

**LESSON 3**

**Energy and Matter**

**Key Concept**  How is the movement of energy in an ecosystem modeled?

**Directions:** Answer each question or respond to each statement on the lines or in the space provided.

1. What is a food chain?

2. In the space below, draw a food chain that begins with the Sun and has the following organisms: a fox that eats a rabbit, a plant, a rabbit that eats a plant. You may draw pictures of the organisms or write their names. Label the producer, herbivore, and carnivore.

3. What is a food web?

4. In the space provided, use the names of organisms and arrows to draw part of a food web that begins with the Sun and includes the following organisms: plants; grasshoppers, mice, and rabbits that eat plants; frogs that eat grasshoppers; snakes that eat frogs and mice; and an owl that eats snakes, rabbits, and mice.

5. Which organisms in an energy pyramid have the most energy available to them?

6. Which organism in an energy pyramid has the least energy available?

7. What does an energy pyramid have in common with a food chain and a food web?
Key Concept Builder

LESSON 3

Energy and Matter

Key Concept  How does matter move in ecosystems?

Directions: Answer each question on the lines provided.

Cycles of Matter

1. How does the transfer of matter in an ecosystem differ from the transfer of energy?

2. What do the amount and types of matter in an environment determine?

3. How does water cycle through an ecosystem? Be specific.

4. What is the role of producers and consumers in the oxygen cycle?

5. What are two human activities that add carbon to the atmosphere? Explain your answer.

6. What organisms remove carbon dioxide from the atmosphere?

7. Where does carbon exist on Earth?

8. Which molecule contains carbon and is part of the oxygen cycle and the carbon cycle?

The Lungs of the Planet

Producers remove carbon dioxide from the atmosphere during photosynthesis. This process is a crucial part of the carbon cycle. Vast forests are made of trees that photosynthesize. What would happen to the carbon cycle if these forests disappeared?

In 1800, there were 2.9 billion hectares of tropical rain forests in the world. Today, there are fewer than 1.4 billion hectares. In the last 40 years alone, more than 0.4 billion hectares of tropical rain forest have been destroyed. Rain forests play a role in Earth’s climate. They are often called the lungs of the planet because they help remove carbon dioxide from the atmosphere.

If rain forests disappeared, more carbon dioxide would likely remain in the atmosphere. Carbon dioxide helps trap heat from the Sun. Higher levels of atmospheric carbon dioxide would cause Earth’s temperature to rise. The carbon cycle—and Earth’s climate—would be disrupted.

Looking Back for an Answer

Some scientists are looking to the past to help preserve tropical rain forests. They note that ancient civilizations in the Amazon region grew crops without cutting down large parts of the forest. These ancient peoples cleared only small, circular plots of land. After several years, the farmers would abandon the land, and forest plants and animals would move back into the area. Modern farmers in the Amazon might be able to use similar techniques to grow crops.

Scientists are also teaching loggers in the Amazon about forest conservation and land-use practices. Loggers are encouraged to create tree farms that can be grown for commercial use and then replanted and harvested again.

Applying Critical-Thinking Skills

Directions: Answer each question or respond to each statement.

1. Calculate the percentage of the rain forest that has been destroyed since 1800. Then calculate the following: If 0.4 billion hectares of rain forest continue to be cut down every 40 years, how many years will it take before all rain forests are gone?

2. Predict the best way to prevent the destruction of tropical rain forests.