What Is the Web of Life?

All organisms, or living things, are linked together in the web of life. In this web, energy and resources pass between organisms and their surroundings. The study of how different organisms interact with one another and their environment is ecology.

An alligator may hunt along the edge of a river. It may catch a fish, such as a gar, that swims by too closely. As it hunts, the alligator is interacting with its environment. Its environment includes other organisms living in the area. The alligator depends on other organisms to survive, and other organisms depend on the alligator.

However, one organism eating another is not the only way living things interact. For example, when it gets too hot, the alligator may dig a hole in the mud under water. When the alligator no longer uses the hole, fish and other organisms can use it. They may live in the hole when the water level in the rest of the river is low.

Living things in an environment interact.
What Are the Two Parts of an Environment?

An organism’s environment is made up of biotic and abiotic parts. **Biotic** describes the living parts of the environment, such as fish. **Abiotic** describes the nonliving parts of the environment, such as rivers. Organisms need both biotic and abiotic parts of the environment to live.

How Is the Environment Organized?

The environment can be organized into five levels. Individual organisms are at the first level. The higher levels include more and more parts of the environment. The highest level is called the biosphere. It is the largest level, and includes all the other levels.

1. **An individual** is a single organism.

2. **A population** is a group of individuals of the same species in the same area. For example, all the alligators in the same river make a population. The whole population uses the same area for food and shelter.

3. **A community** is made up of all the different populations that live and interact in the same area. The different populations in a community depend on each other. For example, alligators eat other animals, including fish. Alligators create water-filled holes where fish and other organisms in the river can live during dry seasons.
4. An **ecosystem** is made up of a community and its abiotic environment. The abiotic factors provide resources for all the organisms and energy for some. A river, for example, can provide water for river plants and many animals, and shelter for water insects. It can provide nutrients for plants, as well as food for fish and alligators.

5. The **biosphere** is the part of Earth where life exists. The biosphere is the largest environmental level. It reaches from the bottom of the ocean and the Earth’s crust to high in the sky. Scientists study the biosphere to learn how organisms interact with abiotic parts of the environment. These abiotic parts include Earth’s atmosphere, water, soil, and rock.

**TAKE A LOOK**

4. **Identify** Use colored pencils to make circles on the picture.
   - Circle an individual in red.
   - Circle a population in blue.
   - Circle a community in brown.
   - Circle an ecosystem in green.

**Math Focus**

5. **Calculate** From sea level, the biosphere goes up about 9 km and down about 19 km. What is the thickness of the biosphere in meters?
SECTION VOCABULARY

| **abiotic** | describes the nonliving part of the environment, including water, rocks, light, and temperature |
| **biosphere** | the part of Earth where life exists |
| **biotic** | describes living factors in the environment |
| **community** | all of the populations of species that live in the same habitat and interact with each other |
| **ecology** | the study of the interactions of living organisms with one another and with their environment |
| **ecosystem** | a community of organisms and their abiotic, or nonliving, environment |
| **population** | a group of organisms of the same species that live in a specific geographical area |

1. **Compare**  What is the difference between a community and an ecosystem?

2. **Organize**  Complete the chart below to describe the five levels of the environment, from smallest to largest.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a single organism</td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>all of the populations of species that live in the same habitat and interact with one another</td>
</tr>
<tr>
<td>Ecosystem</td>
<td></td>
</tr>
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3. **Identify**  What two kinds of factors does an organism depend on for survival?

4. **Infer**  Would all the birds in an area make up a population? Explain your answer.
8. Indian elephants have smaller ears and tusks than African elephants do.

9. Deer are more closely related to giraffes. They are both even-toed hoofed mammals.

10. Like all mammals, cetaceans have lungs and nurse their young.

11. They move slowly, so they can’t get away from boats quickly. They have to come to the surface to breathe, so they may be near boats often.

12. opposable thumbs

13. apes

14. grasping tails

**Review**

1. The placenta attaches the embryo to the uterus. It brings food and oxygen to the embryo and carries wastes away.

2. They group them based on how they evolved and how closely they are related.

3. Unlike pinnipeds, manatees spend all of their time in the water. Manatees do not have the sharp canine teeth that pinnipeds have. Manatees eat plants, and pinnipeds eat meat.

4. Primates have opposable thumbs. Most have flat fingernails instead of claws.

5. It should be grouped with mammals with shearing teeth. It has sharp canine teeth that can tear meat. It does not have a trunk or hooves. It does not have long incisors. It does not fly or live in the water.

**SECTION 5 MONOTREMES AND MARSUPIALS**

1. lay eggs, no nipples

2. 0.06%

3. Any three characteristics of mammals is appropriate. Possible answers: mammary glands, diaphragm, hair

4. The young develop inside a pouch.

5. Australia, New Guinea, and South America

6. They are exotic because they were brought there by humans.

**Review**

1. platypuses, echidnas

2. Monotremes: They lay eggs and have no nipples.

   Marsupials: They give birth to live young; young develop in pouches.

   Both: They have hair, specialized teeth, large brains; they breathe air, make milk, reproduce sexually; they are endothermic and not placental.

3. to search for food

4. Answers will vary. Accept any three of the following: kangaroo, wallaby, koala, Tasmanian devil, opossum, bettong, wombat.

5. Newborn marsupials are not well developed. They have no hair and can use only their front limbs.

6. Europeans brought exotic species to Australia. Some of the exotic species competed with marsupials for food. Others ate the marsupials. Many marsupials are endangered because their habitats have been destroyed.

**Chapter 18 Interactions of Living Things**

**SECTION 1 EVERYTHING IS CONNECTED**

1. Biotic factors are living; abiotic factors are nonliving.

2. Individuals make up a population. Both levels include organisms of only one species.

3. No, different populations must interact in an ecosystem.

4. A single alligator or bird should be circled in red, the three alligators in blue, all the animals and plants in brown, and the whole picture in green.

5. 28,000 m

**Review**

1. A community is all the populations that interact in the same area. An ecosystem is the community plus the abiotic factors in the environment.

2. | **Level**     | **Description**                                      |
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3. An organism depends on biotic factors (other organisms) and abiotic factors (water, rocks, light, temperature, air).
4. No, only organisms of one species make up a population. There are usually more than one species of bird in an area.

SECTION 2 LIVING THINGS NEED ENERGY
1. Producers use energy from sunlight to make their own food.
2. Tigers: carnivores
   Deer: herbivores
   Humans: omnivores
3. Decomposers break down dead matter into nutrients for other organisms to use.
4. Labels go on sun, grasses, prairie dog, coyote, vulture, and bacteria, in that order.
5. Most organisms eat more than one type of food.
6. Without producers, consumers would have no food. None of the animals would live.
7. about 90%
8. The middle level—deer are herbivores like the prairie dogs.
9. Wolves were at the top of the food chain and controlled the populations of herbivores.

Review
1. Producers use energy from the sun to make their own food. Producers are the base of the food chain. All consumers depend on producers.
2. Grass (Producer)→Mouse (Primary consumer)→Snake (Secondary consumer)
3. Answers will vary but should include at least one of the organisms from question 2.
4. No, energy is lost as it moves through a food chain. After a few steps in the chain, there isn’t enough energy left to support more organisms.

SECTION 3 TYPES OF INTERACTIONS
1. a resource that keeps a population from growing forever
2. if the amount of the limiting factor changes
3. in competition, as predator and prey, through symbiosis, and coevolution
4. elk and prairie dogs
5. speed, colors that let them blend with the environment
6. Possible answer: It may be difficult for the predator to see individual animals in the group.
7. Any combination of black and orange patches is acceptable.
8. mutualism, commensalism, parasitism
9. In mutualism, both species benefit. In commensalism, only one species benefits.
10. The host is hurt.
11. The wasps can use the caterpillar for food.

Chapter 19 Cycles in Nature

SECTION 1 THE CYCLES OF MATTER
1. Water vapor cools and changes into drops of liquid water. The water drops form clouds.
2. Photosynthesis uses carbon dioxide from the air. When the sugars that a plant makes during photosynthesis are broken down, carbon returns to the environment.
3. photosynthesis
4. respiration, combustion, decomposition
5. Animals need to get nitrogen from plants or other animals. Plants get their nitrogen from nitrogen fixation.
6. decomposition
7. They are recycled in the environment or reused by other organisms.

Review
1. energy from the sun
2. There should be arrows from air to plants to animals to decomposers to air, and from plants to decomposers.
3. Matter on Earth is limited, so it needs to be used over and over again.
4. Living things are made mostly of water. Water carries nutrients to cells and carries wastes away. Water also helps organisms regulate their body temperatures.