Unit 1

Living Things and the Environment

Key Words

classify

organism

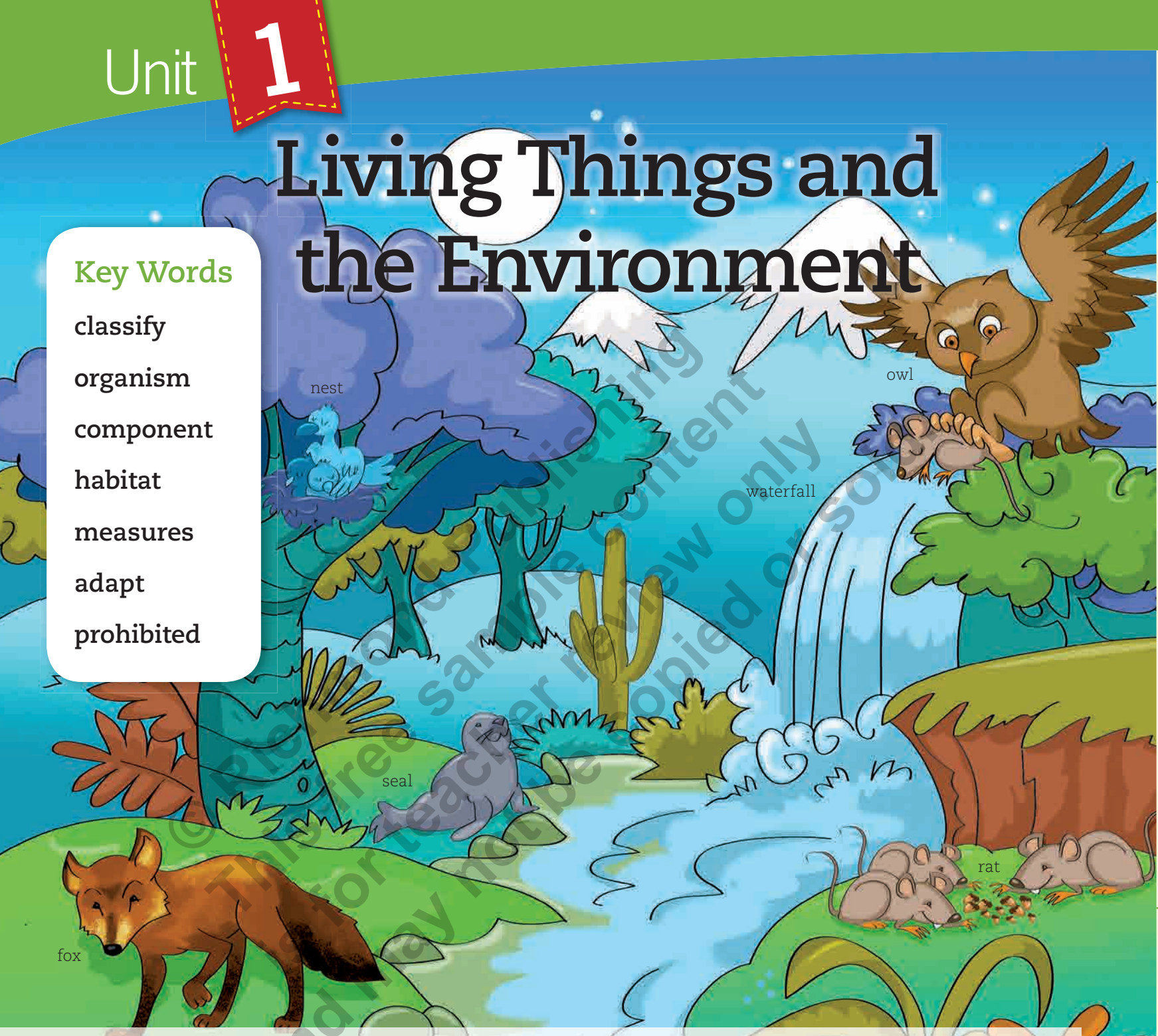
component

habitat

measures

adapt

prohibited



In this unit you will learn to:

- recognize that an ecosystem consists of interacting biotic and abiotic components.
- observe and compare the adaptations that plants and animals have made to survive in their ecosystems.
- give examples of food chains in ecosystems, and identify the function of each organism.
- suggest research questions related to the adaptations of birds.

What Do You Know?

Initial Evaluation

1. In the picture, mark the living things with a ✔ and the nonliving things with an ✘.

2. Circle the living things that are not in their natural habitat.

3. What do owls eat? ☐ mice ☐ fruit

4. What do mice eat? ☐ grass ☐ fruit

5. Write the name of the habitat that is represented in each image.

_____

_____

_____

Scientific Skill: Formulate questions

6. The fox in the picture was found by a group of scientists, who then took it to a rehabilitation center because of its hurt paw. Thinking about this situation, which of the following questions would you suggest investigating? Mark with a ✔.

paw → an animal's foot

- ☐ How will the fox be affected by being taken out of its environment?
- ☐ What happened to the fox's paw?
- ☐ What is the relationship between a fox and an owl?
- ☐ What will happen if contaminants are added to the river water?

Connecting

Living Things in Nature

Maybe you have visited some natural environments on vacation, like a forest, a beach or even a desert. These areas are different from each other, but it is very likely that you have encountered common characteristics, too. What are some of their common characteristics? To answer this question, look at the following images.

probable

algae

Observing the images, you can see that there are many types of plants in a forest and many types of birds and seaweed at the beach. As a result of the extreme temperatures, low precipitation and poor soil in the desert, there are fewer plants and animals. As you can see, in these three cases there is one characteristic in common: the presence of living things. **It is possible to find living things in the majority of natural environments**. However, you can also find them in artificial environments.

1. Look at the following image and answer.
   a. What living things can you see?
   b. Is the environment natural or man-made?
   c. How many groups or sets of living things do you see?
   d. To classify the components of this area, what criteria would you use?

artificial

The Organization of Living Things

In nature, it is possible to see different levels of organization:

Population: This is a set of living things of the same species that live in the same area at the same time. The penguins in the picture are an example of this.

Community: These are populations that live in the same area at the same time. For example, penguins live together with fish, sea lions and other organisms.

in combination

Ecosystem: This refers to a community of living things and their environment, and all the interactions that occur between them.

Word Focus

A **species** is a group of living things with similar characteristics that have **fertile** offspring when they reproduce.

babies

Practicing

2. Give an example for each level of organization of living things. Exemplify

Population	Community	Ecosystem

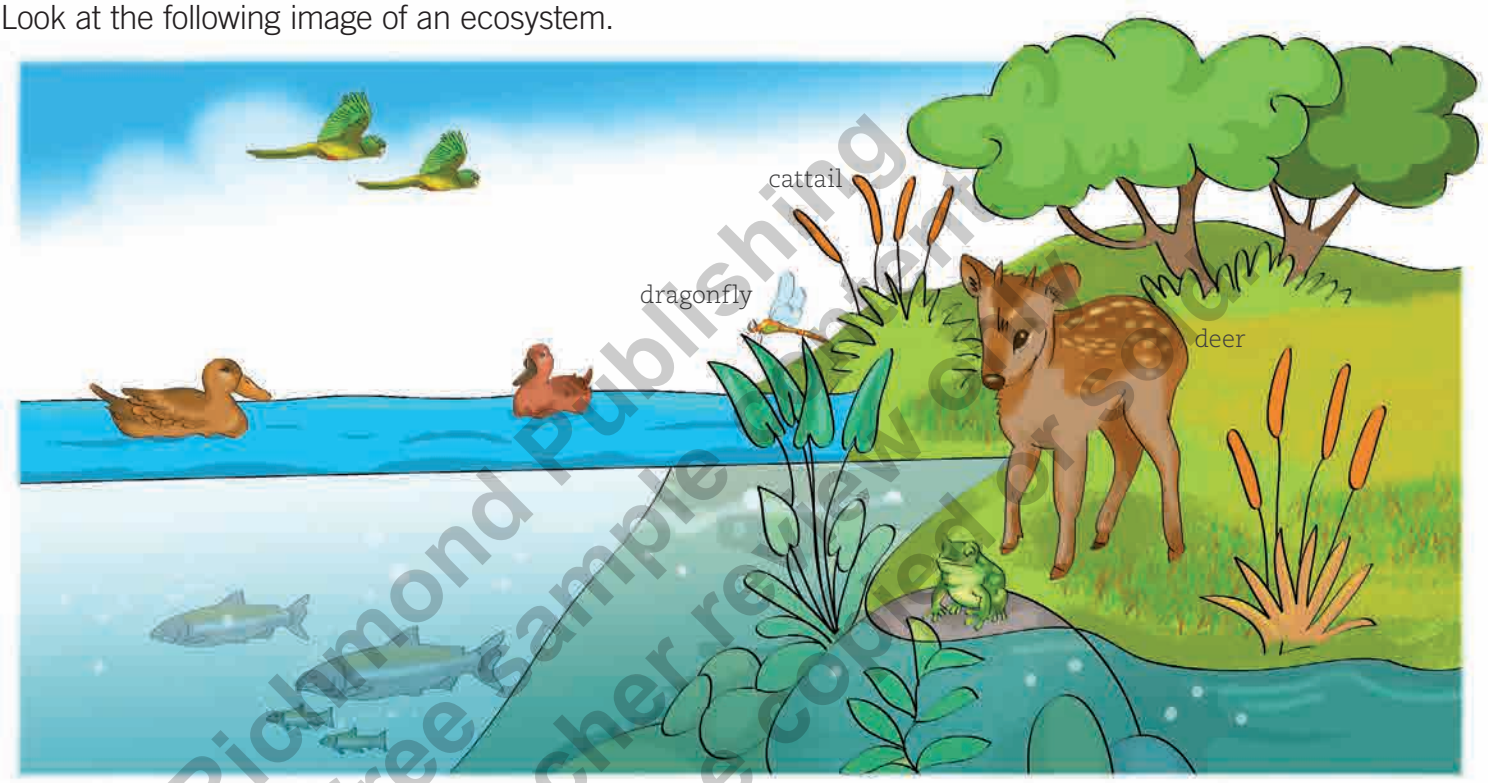
Summarizing

In nature, living things interact with each other, and it is possible to organize things as populations, communities and ecosystems.

Connecting

An Ecosystem and Its Components

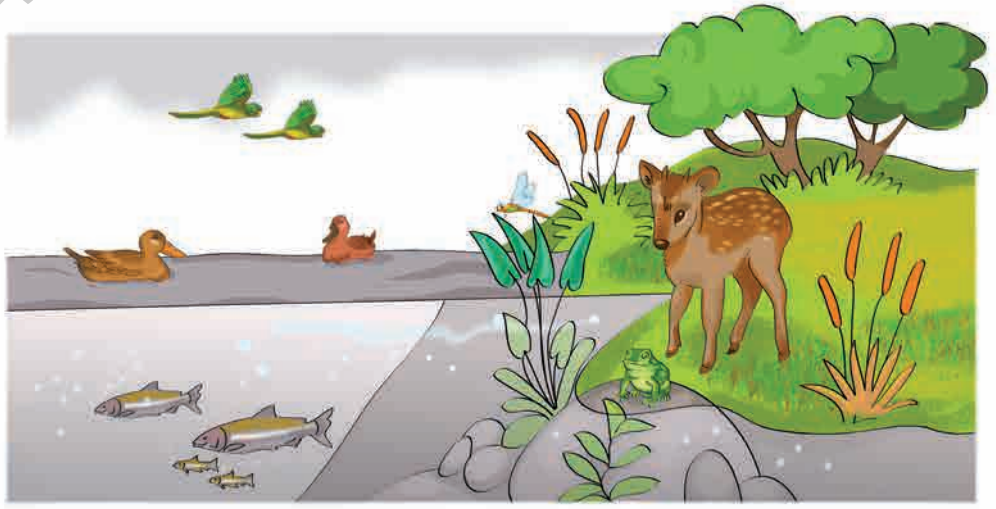
Look at the following image of an ecosystem.



How could we classify the components of an ecosystem? If you look at the image, you will see that there are always two fundamental components: **biotic factors**, which are all living things in an ecosystem, and **abiotic factors**, which are all the nonliving things in an ecosystem.

Biotic Factors

The biotic factors of an ecosystem are **all the living things that live in it**. Different types of plants, animals, fungi and bacteria are all biotic factors.



Tip

Inert and nonliving aren't the same. Nonliving things have never been alive. Inert things don't move.

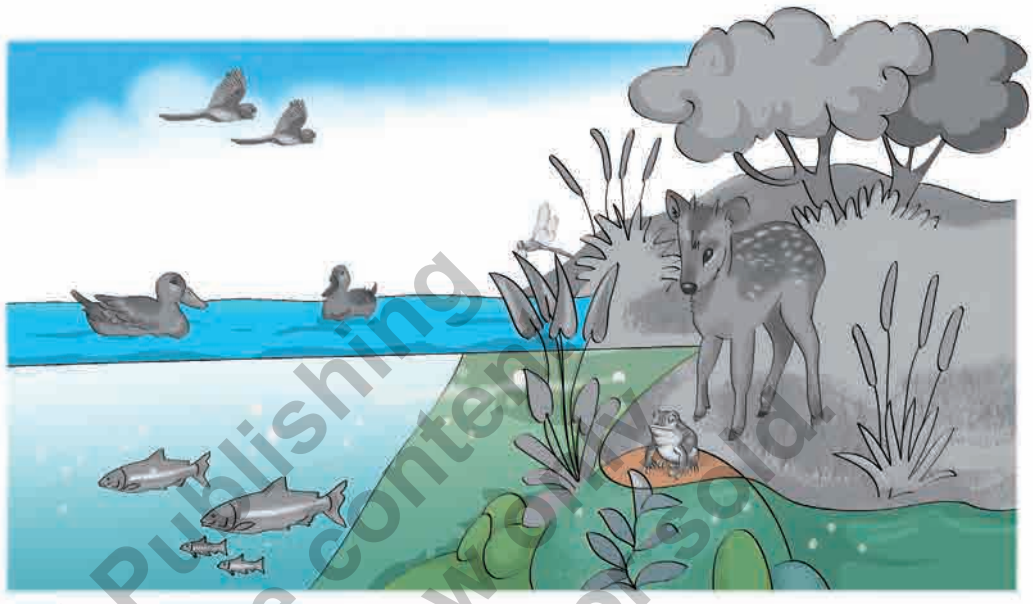
Abiotic Factors

Abiotic factors are **all the nonliving things in an ecosystem**, like water, air, rocks, light and temperature. All these factors are necessary for living things to live and develop.

In an ecosystem, there is not a single organism that exists isolated from its environment: an organism may not interact with other organisms, but it always interacts with the abiotic factors that surround it.

separate

Biotic and abiotic factors always **interact**.



Practicing

1. Circle the biotic factors in and the abiotic factors in in the ecosystem below. Recognize

Summarizing

Ecosystems consist of biotic and abiotic factors. Biotic factors are all the living things, and abiotic factors are all the nonliving things.

Connecting

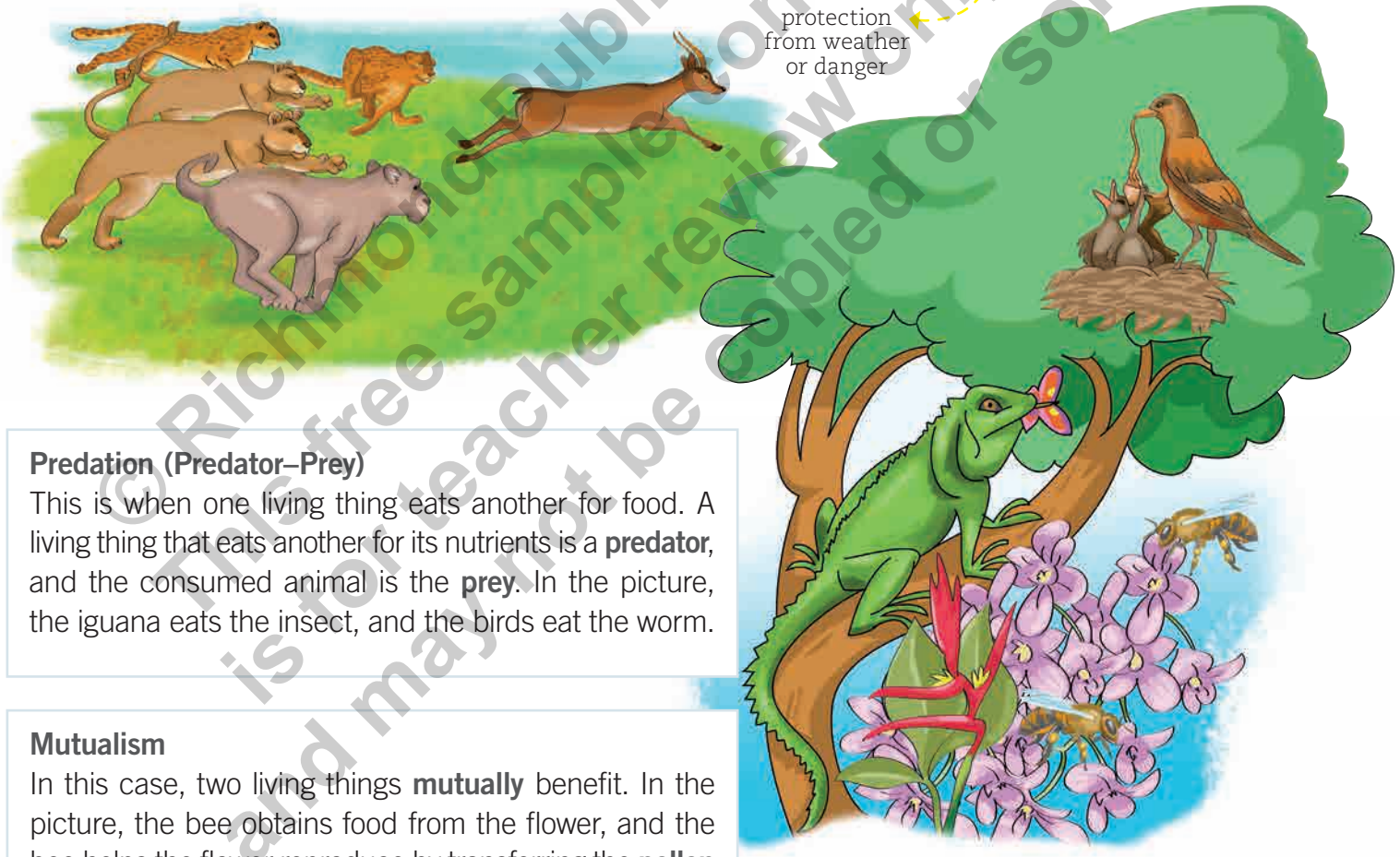
Interactions in an Ecosystem

There exist many forms of relationships between living things in ecosystems. For example, a cow interacts with the grass by eating it. A bird interacts with a tree while making a nest in its branches. Some interactions that can occur between two organisms are:

nest → place to lay eggs

Competition
This is when two organisms **compete** for the same resource, like food or shelter. The lions and cheetahs in the picture are competing for food.

shelter → protection from weather or danger



Predation (Predator–Prey)
This is when one living thing eats another for food. A living thing that eats another for its nutrients is a **predator**, and the consumed animal is the **prey**. In the picture, the iguana eats the insect, and the birds eat the worm.

Mutualism
In this case, two living things **mutually** benefit. In the picture, the bee obtains food from the flower, and the bee helps the flower reproduce by transferring the **pollen** that sticks to its body and legs to other flowers.

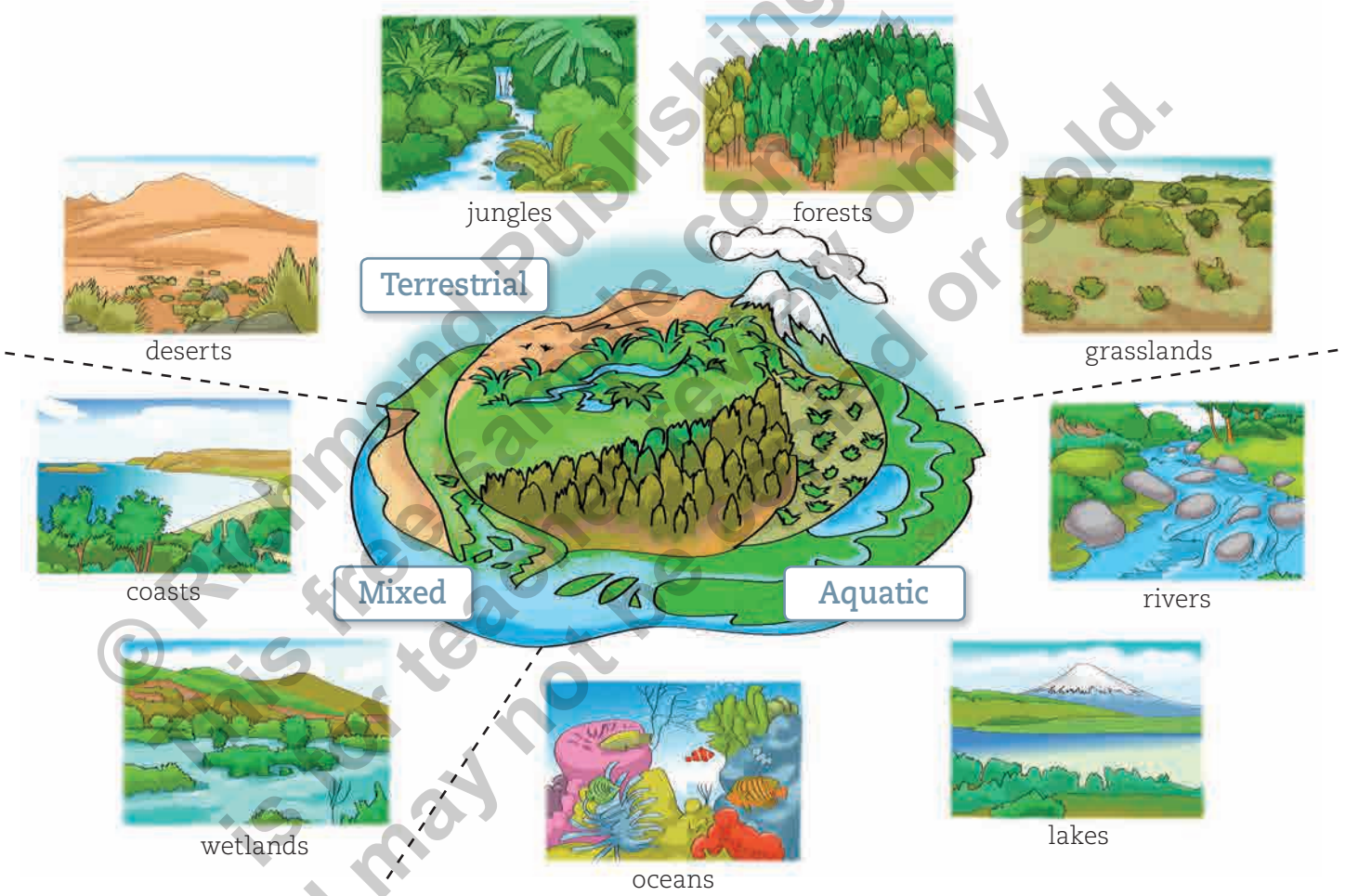
Living things also interact with the abiotic components of the ecosystem. For example, when animals breathe, they interact with the air around them, and some animals interact with the rocks, twigs and soil to make nests. What do you interact with?

twigs → small sticks

Types of Ecosystems

It is possible to encounter many different types of living things and diverse ecosystems if you observe nature. Although many different types of ecosystems exist, there are three main types.

- **Aquatic ecosystems:** Living organisms develop and interact in water, such as oceans, lakes or rivers.
- **Terrestrial ecosystems:** Living organisms develop and interact on land.
- **Mixed ecosystems:** Living organisms develop and interact in areas where water meets land, like on the coast and wetlands.



Ecosystems are characterized by their biotic and abiotic factors.

Did You Know...?

Forests, wetlands, deserts and other types of ecosystems are classified as **biomes**. For example, grasslands are a terrestrial biome.

Education through Values

We should all be respectful of nature since any interference, like logging, can alter the natural equilibrium.

harvesting trees

Practicing

1. Write the type of interaction below each picture. Identify

2. Look at the following images of ecosystems and mark the correct type. Identify

- ◯ aquatic
- ◯ terrestrial
- ◯ mixed

- ◯ aquatic
- ◯ terrestrial
- ◯ mixed

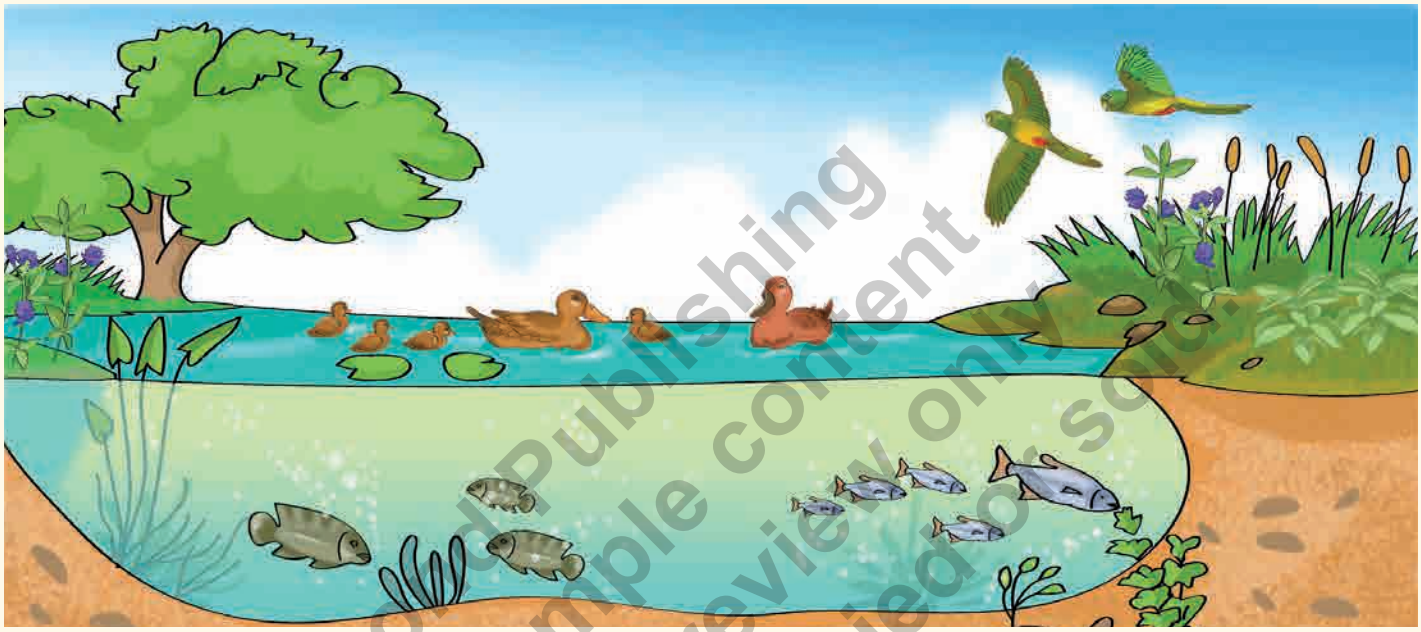
- ◯ aquatic
- ◯ terrestrial
- ◯ mixed

Summarizing

In ecosystems, the biotic factors always interact—for example, through predation, competition and mutualism. There are also interactions between biotic and abiotic factors, like birds building nests. There are three main types of ecosystems: aquatic, terrestrial and mixed.

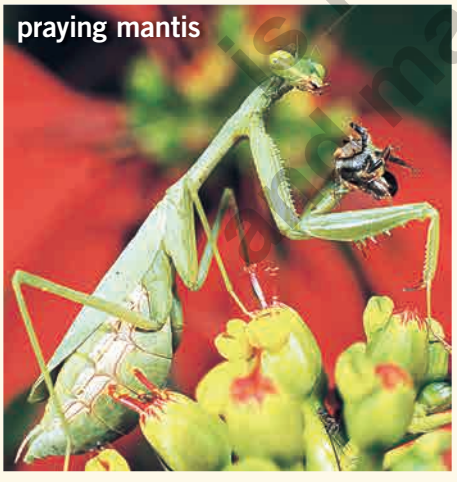
Quiz Yourself

1. Look at the ecosystem, and then complete the table with three biotic and three abiotic factors.



Biotic Factors	Abiotic Factors

2. Write the type of interaction shown in each picture.



Section 2

Adaptations of Living Things

Connecting

Living Things and Their Environment

When it rains, do you wear special clothes? Can you imagine a plant or an animal doing something similar? That would be very strange! Unlike humans, plants and animals have to adapt to all the conditions in nature, like cold or hot weather. They do not use clothing to keep warm; they have to depend on their body covering.

strange → unusual

It is for this reason that, in nature, living things have developed **adaptations**. Adaptations are structures or behaviors that permit living things to grow and survive in the conditions of their environment.

behaviors → ways of acting

Conditions Living Things Adapt To

Look at the following images. Which environment does each organism belong to?

penguin

environment 1

cactus

environment 2

Each organism has certain characteristics according to the environment it lives in. It would be unusual to see a cactus growing on ice or a penguin in the desert!

In order to survive in their environment, plants and animals develop adaptations in relation to:

- their form of movement.
- the type of food they eat.
- the attacks of predators.
- the temperature of the environment.
- the quantity of available water.

Challenge

What is your favorite animal? Does it have any adaptations to its environment? Make a poster and show it to the class.

Practicing

1. Match each organism with its environment. Relate

Summarizing

permit

Living things have adaptations related to the environment they live in. These adaptations are structures and behaviors that allow them to live in an area.

Connecting

How Animals Move

The body structures related to movement are a very clear example of how certain animals adapt to their environments.

Animals from terrestrial ecosystems all have feet adapted to the different conditions that they move in.

Many animals from aquatic ecosystems have elongated bodies and fins that permit them to move easily through water.

unusually long

Some animals, like birds, have feet but can also fly because they have developed wings and light bones.

Some animals that live in mixed ecosystems have adaptations that allow them to move in water and on land. An example is the webbed feet of some birds and amphibians.

Word Focus

Webbed refers to the structures that connect toes and fingers in some animals, such as frogs and ducks. They are an adaptive function that enable the animals to swim.

Some terrestrial animals, like snakes, do not have feet and therefore drag themselves or slither to move.

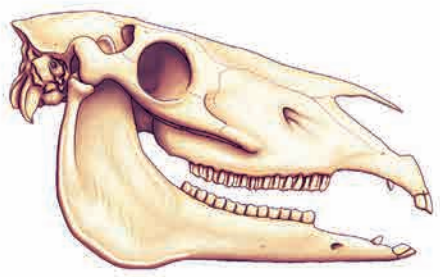
Many insects also have wings and can fly.

Teeth and Diet

An adequate diet is one of the most important necessities for animals. The type of teeth an animal has is directly related to the type of food it eats.

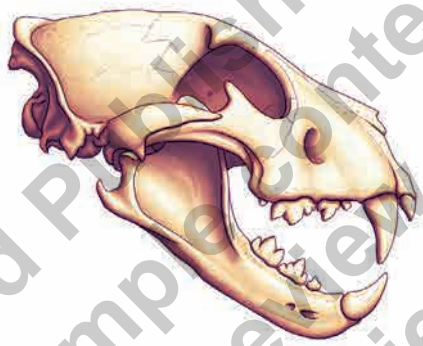
Herbivores have large teeth and flat molars to grind vegetables.

reduce to small pieces by rubbing



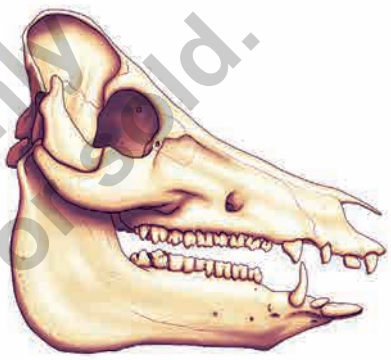
skull

Carnivores have large, sharp fangs that they use to tear the meat of their prey.



Omnivores have flat teeth and molars in addition to slightly sharp fangs.

to a small extent



Animal Body Coverings

strong, durable

The body covering of an animal is related to the environment in which it lives and can give it various advantages.

Some animals possess tough body coverings that protect them from the attacks of predators.

armadillo

Some body coverings protect animals from losing water in very dry environments.

cobra

Animals from cold environments have body coverings that allow them to prevent the loss of heat.

Arctic fox

How Animals Protect Themselves

absence or deficiency

In nature, animals need to protect themselves from things like cold, heat, lack of water and the attacks of predators. For protection, they develop very specific characteristics and behaviors.

Camouflage

Some animals have colors and shapes that are very similar to the environment in which they live. This allows them to hide from predators or to catch their food. For example, lions use camouflage to help catch their prey.

Mimicry

Many harmless animals have adapted to imitate the colors and shapes of poisonous or dangerous animals. For example, the hoverfly is a harmless insect that has assumed the appearance of bees and wasps in order to avoid possible attacks from other animals.

adopted

Behavior

To **endure** times of cold or scarcity of food, some animals, like the freshwater turtle, hibernate. Others, like the porcupine, raise their spines when they feel threatened.

insufficiency

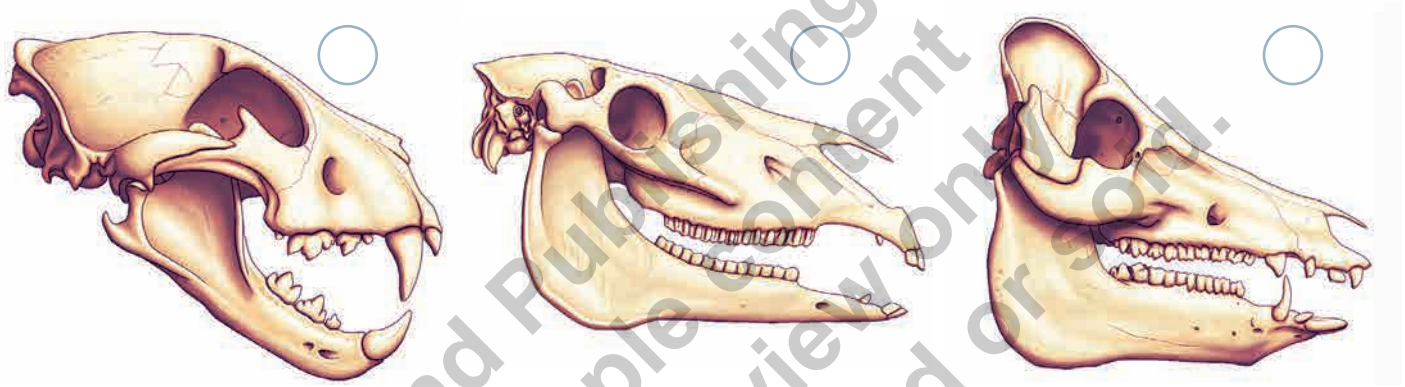
hard, pointed structures

What is the difference between camouflage and mimicry?

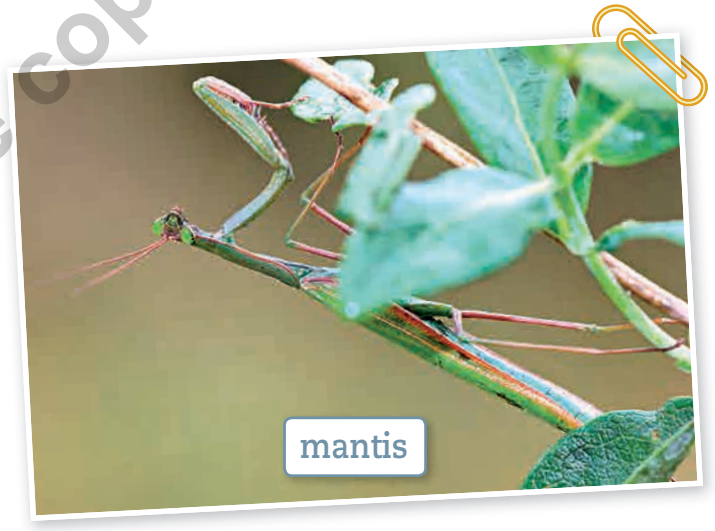
Practicing

1. What adaptations allow animals to move in their environment? Describe

2. Mark with an ✕ the teeth of an animal that eats meat and vegetation. Identify



3. Observe the images and explain which adaptations these animals possess in order to protect themselves. Describe



Summarizing

Animals possess different adaptations in order to protect themselves from the attacks of predators, endure the conditions of their environment and feed themselves.

Connecting

Adaptations in Plants

Plants also have adaptations to their environments. Since they do not have teeth to eat nor body parts to help them move, they have parts that **specialize** in capturing the light and water they need.

How do they resist heat?

In dry environments, plants possess thick stems and leaves that have a kind of jelly inside that stores water. These plants are called **succulents**, and the majority have spines instead of leaves in order to reduce water loss and to protect them from animals. The cactus is an example of a succulent.

How do they resist cold?

To resist cold, some plants lose all their leaves to avoid them freezing and being harmed during the cold of winter. These plants are called **deciduous** plants, and they produce new leaves in the spring.

sufficient

How do they receive adequate light?

Some plants grow huge leaves that help them capture as much light as possible.

Have you seen any plants with these adaptations? Where?

Practicing

1. Look at the following plants and write the adaptations that each one possesses in order to survive in its ecosystem. Identify



Summarizing

Plants have different adaptations, like spines or huge leaves, in order to survive in their ecosystem.

Quiz Yourself

1. Write the similarities and differences between the adaptations that the following living things possess in order to survive in their ecosystems.


Why Do the Beaks of Birds Have Different Shapes?

Basic Framework

Birds have different adaptations depending on what they usually eat. One of the primary adaptations is the shape of their beaks.

Observation

Look the pictures.

What shapes are the beaks of these birds?

Research Question

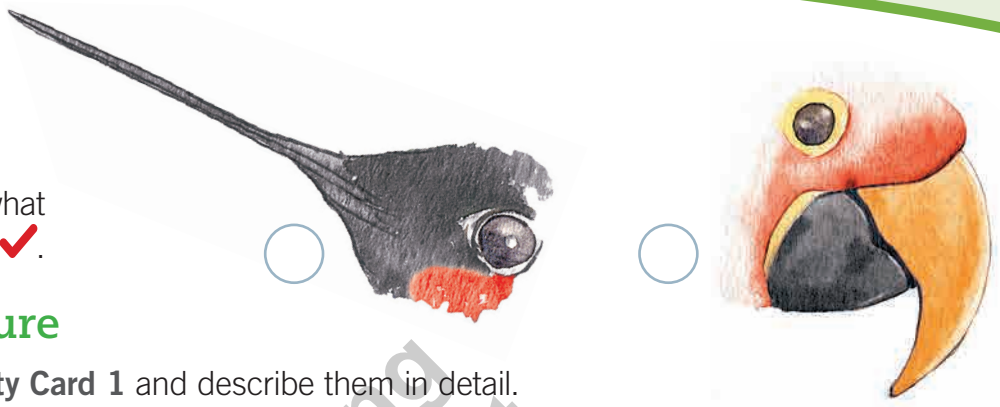
Mark the research question that is related to the adaptation of birds in order to feed themselves.

- [ ] How is the shape of a bird's beak related to the food it eats?
- [ ] Birds have adapted their beaks in order to feed themselves.

The **research question** should be posed as a question about a situation that you wish to explain.

Hypothesis

The shape of a bird's beak is related to its **diet**.



Prediction

1. If a bird feeds on flower **nectar**, what shape will its beak be? Mark with a ✔.

Experimental Procedure

1. Remove the images from **Activity Card 1** and describe them in detail.
2. What does each bird eat? Remove the images from **Activity Card 2** and match each food with the beak of the bird that eats it.

Results

Complete this table with information from the activity cards.

Beak Shape	Type of Food
1	
2	
3	
4	
5	
6	

Interpreting and Analyzing the Results

1. How did you decide which food matched which beak? Explain.

Conclusions

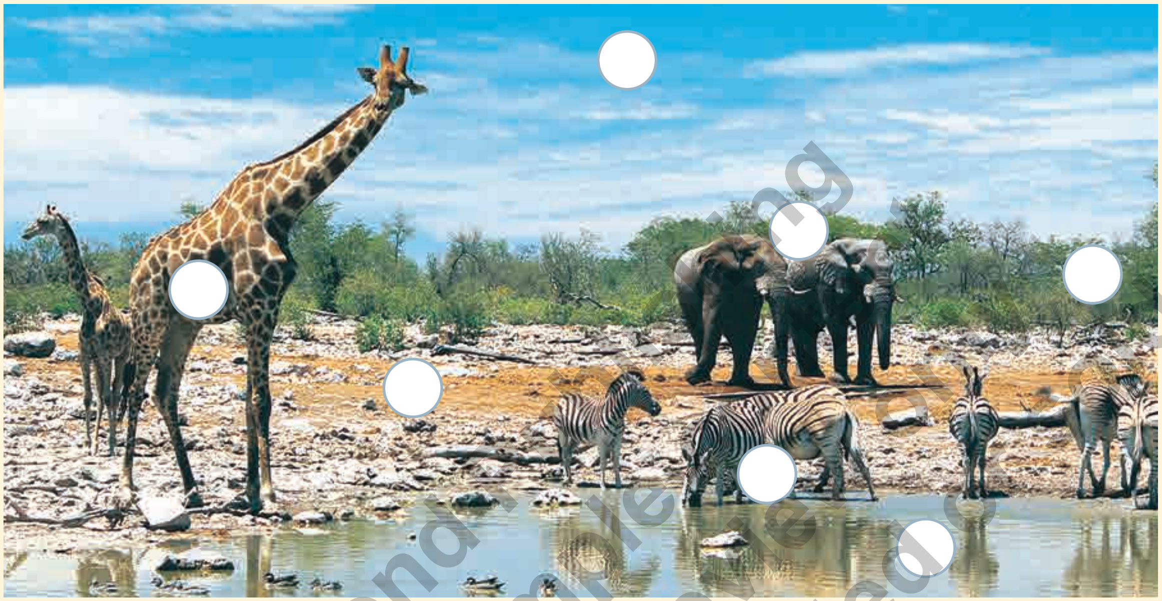
1. Why do the beaks of different birds have different shapes?

2. What relationship could you establish between the shape of a bird's beak and its food?

Let's Check!

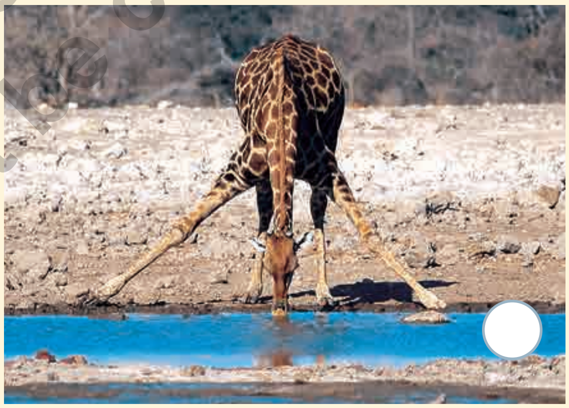
1. Write **A** in each circle if it is an abiotic factor of the ecosystem and **B** if it is a biotic factor.

points
/ 7



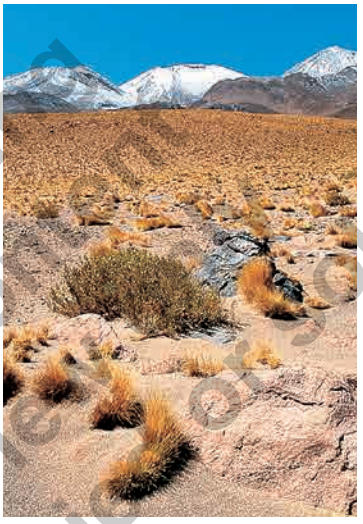
2. Mark the images that show interaction between abiotic and biotic factors with a ✔ and those that show interaction between biotic factors with an ✘.

points
/ 4



3. Find **Cutout 1** on **page 161**. Glue the living things in the environment that they are best adapted to.

points 5

Environment 1	Environment 2	Environment 3
		

a. What adaptations does the fox have to help it live in the Arctic? Could it live in Environment 3? Explain.

4. List the similarities and differences between the adaptations each plant uses to survive in its environment.

points 4

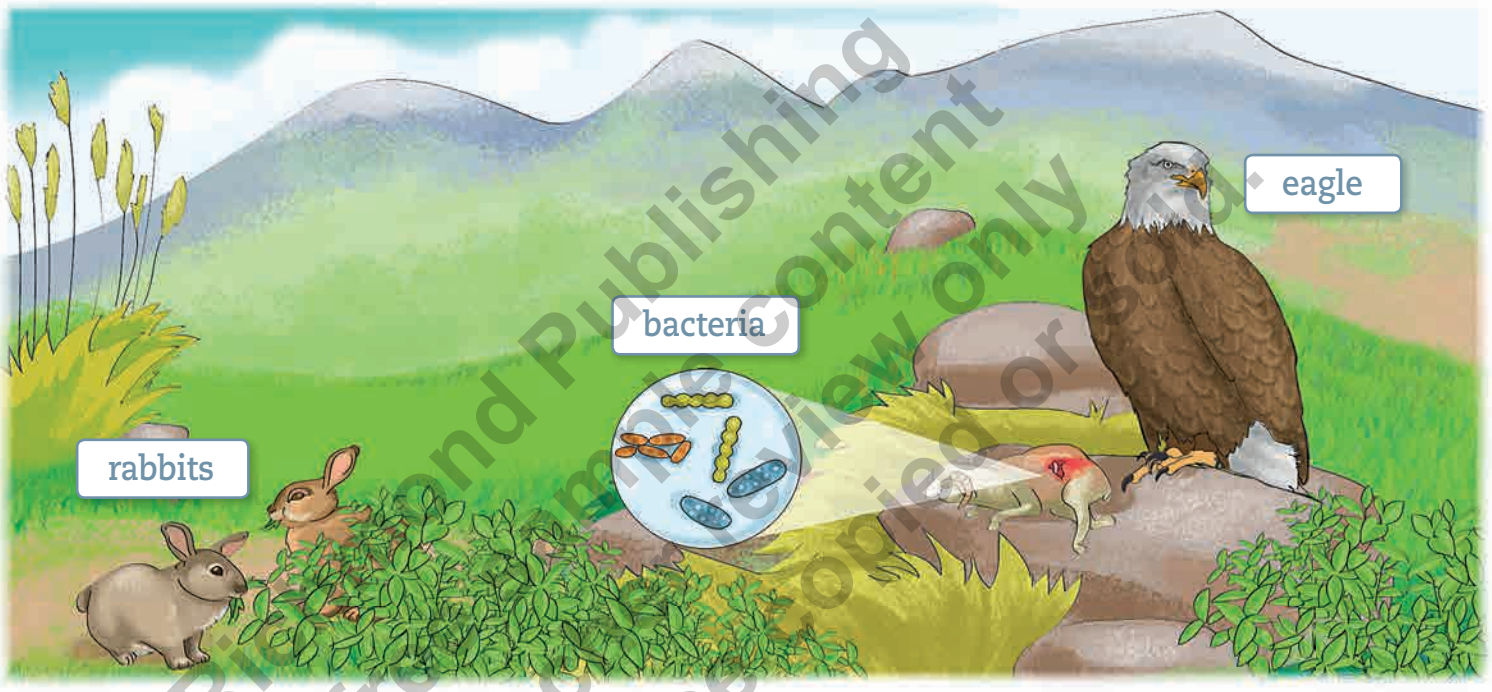
Section 3

Food Chains

Connecting

The Role of Organisms in the Environment

In nature, organisms fulfill defined roles that allow ecosystems to function.



The function of each organism is related to the manner in which it obtains the food and energy it needs. There are three types of roles:

Producers	Consumers	Decomposers
They use sunlight and other abiotic factors from the environment to produce their food. All plants are producers and serve as food for other animals.	They obtain energy by eating other living things. Animals are consumer organisms and can be herbivores, carnivores or omnivores.	They transform the remains and waste left by other organisms into substances that can then be used by producers to make food. Fungi and bacteria are examples.

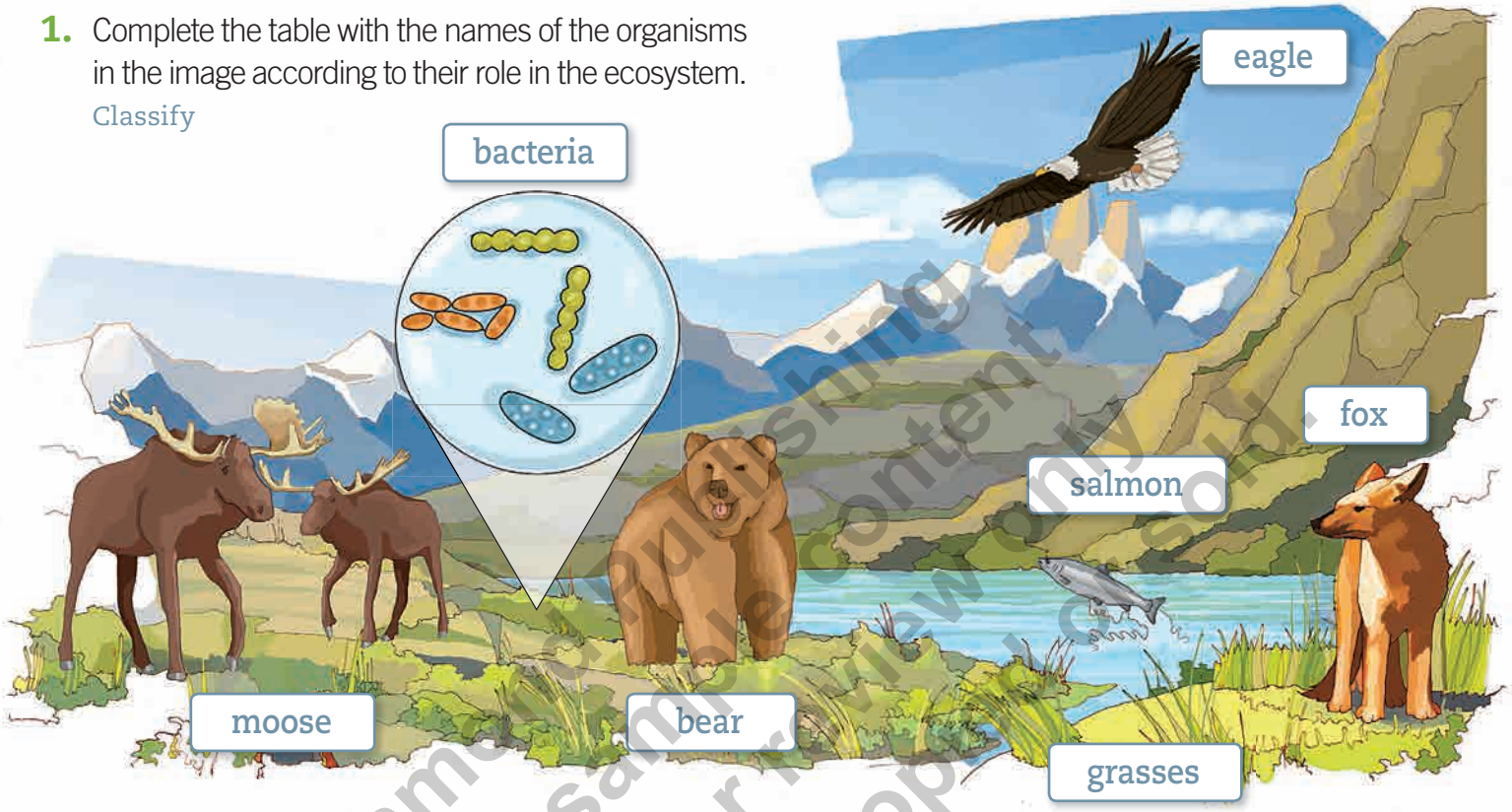
parts left over

Fun Fact!

Carnivorous plants are both producers and consumers, as they feed on the insects they trap.

Practicing

1. Complete the table with the names of the organisms in the image according to their role in the ecosystem.
Classify



Type of Organism	Organisms
Producer	
Consumer	
Decomposer	

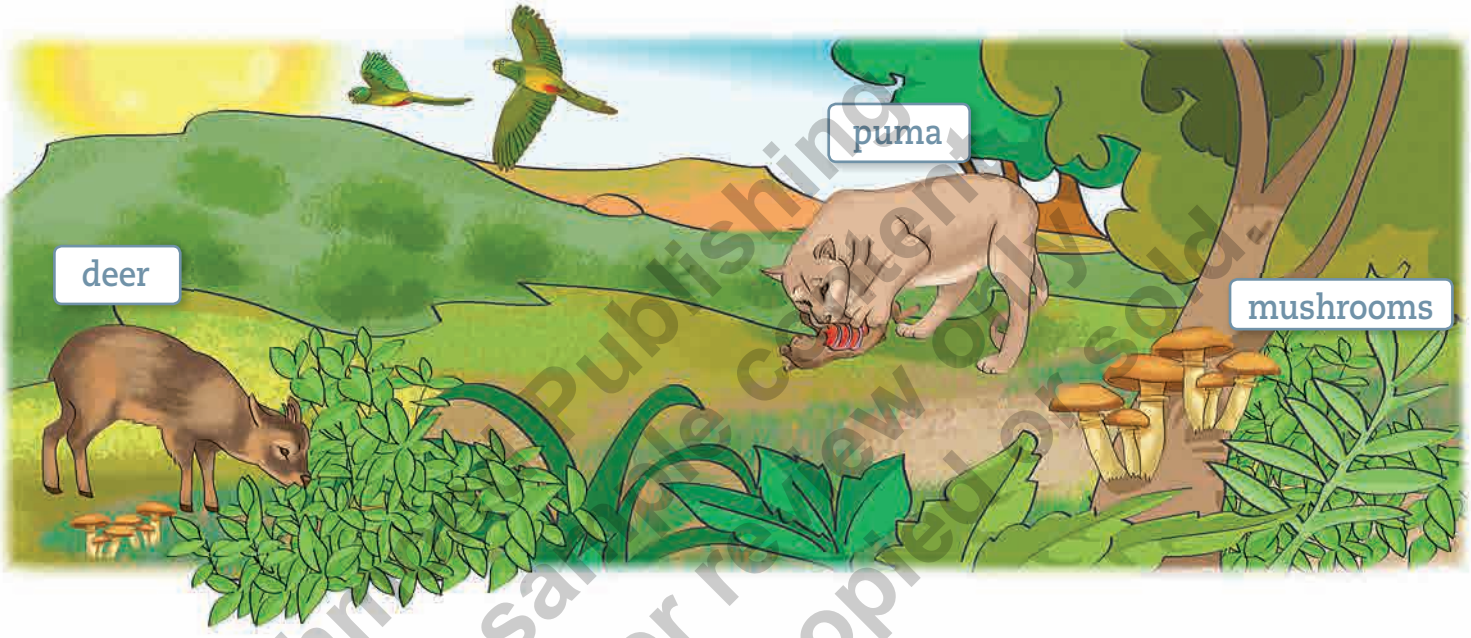
Summarizing

Living things fulfill different roles in an ecosystem. They are classified as producers, consumers or decomposers.

Connecting

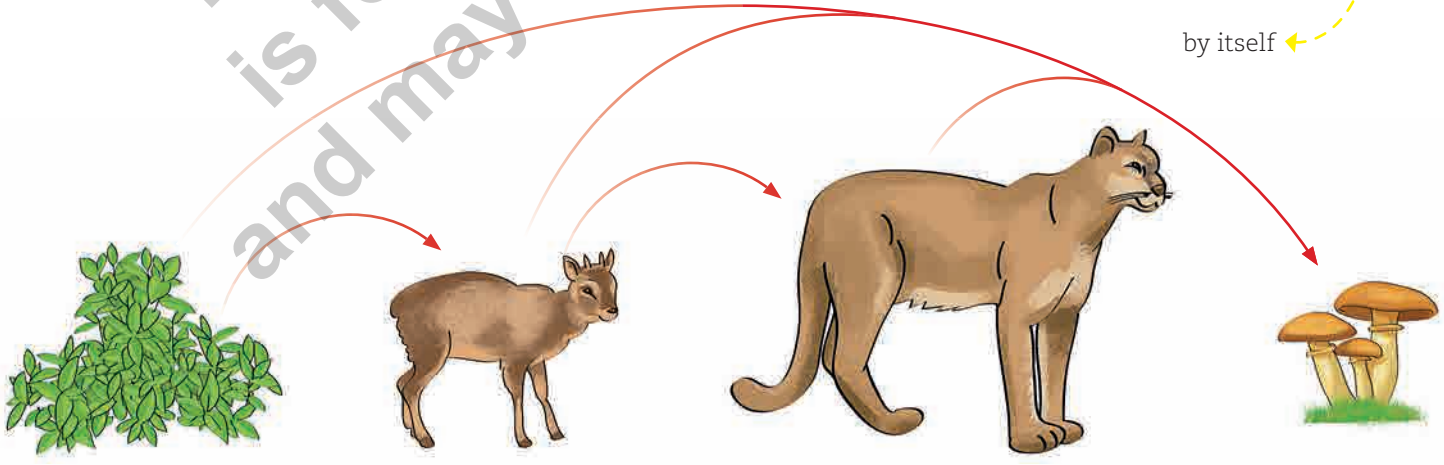
Food Chains

Look at the picture.



How can you relate these living things? The leaves of the bush are food for the deer, the deer is food for the puma, and all of them supply remains and waste that provide nutrients to the mushrooms. These relationships can be shown using a diagram called a **food chain**.

For example, the food chain of the organisms in the picture would be:



In the food chain, the arrows point where the energy flows—in other words, to the consumers and decomposers.

Remember!

Just because something doesn't move on its own doesn't mean it is not a living thing.

by itself

Practicing

1. Find **Cutout 2** on **page 161** and complete the food chain. Draw arrows according to the description. Complete

"In this ecosystem, the fox receives energy from the rabbit, which feeds on the alfalfa."

2. Draw a food chain that includes humans. Apply

Summarizing

A food chain is a representation of one type of relationship between living things in an ecosystem.

What Did You Learn?

1. Use the organisms in **Cutout 3** on **page 163** to make a food chain

points 5

2. Look at the images and write the similarities and differences between the adaptations that each of these living things has.

points 4




3. If two organisms compete for a resource—for example, food or shelter—what is the name of this type of interaction? Mark the correct alternative with a ✔.

point 1

A. Competition.

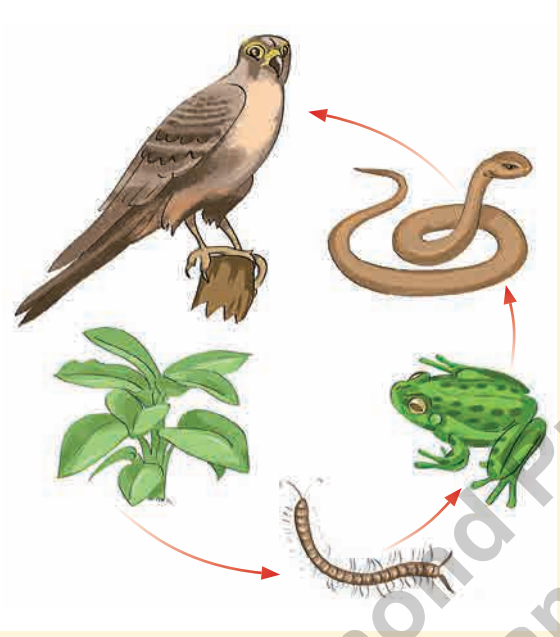
B. Predation.

C. Mutualism.

D. Mimicry.

4. Look at the following food chain and write the role of each organism.

points 6



plant: _____

centipede: _____

frog: _____

snake: _____

falcon: _____

a. What type of organism is missing from this chain?

_____

_____

5. Read the following text and answer.

points 6

The populations of several species of sea turtles have decreased because of the harvesting of their eggs to sell as food. This has put some turtles in danger of extinction.

reduced in size or quantity

a. Does this situation describe a damaged ecosystem? Explain.

_____

b. What measures would you propose in order to protect and recover this ecosystem? Name two.

_____

Scientific Skill: Formulate questions

c. Consider the situation above. What research question would you formulate to find the effects of this population decrease on the ecosystem?

_____

_____

Find Test 1 Study Page