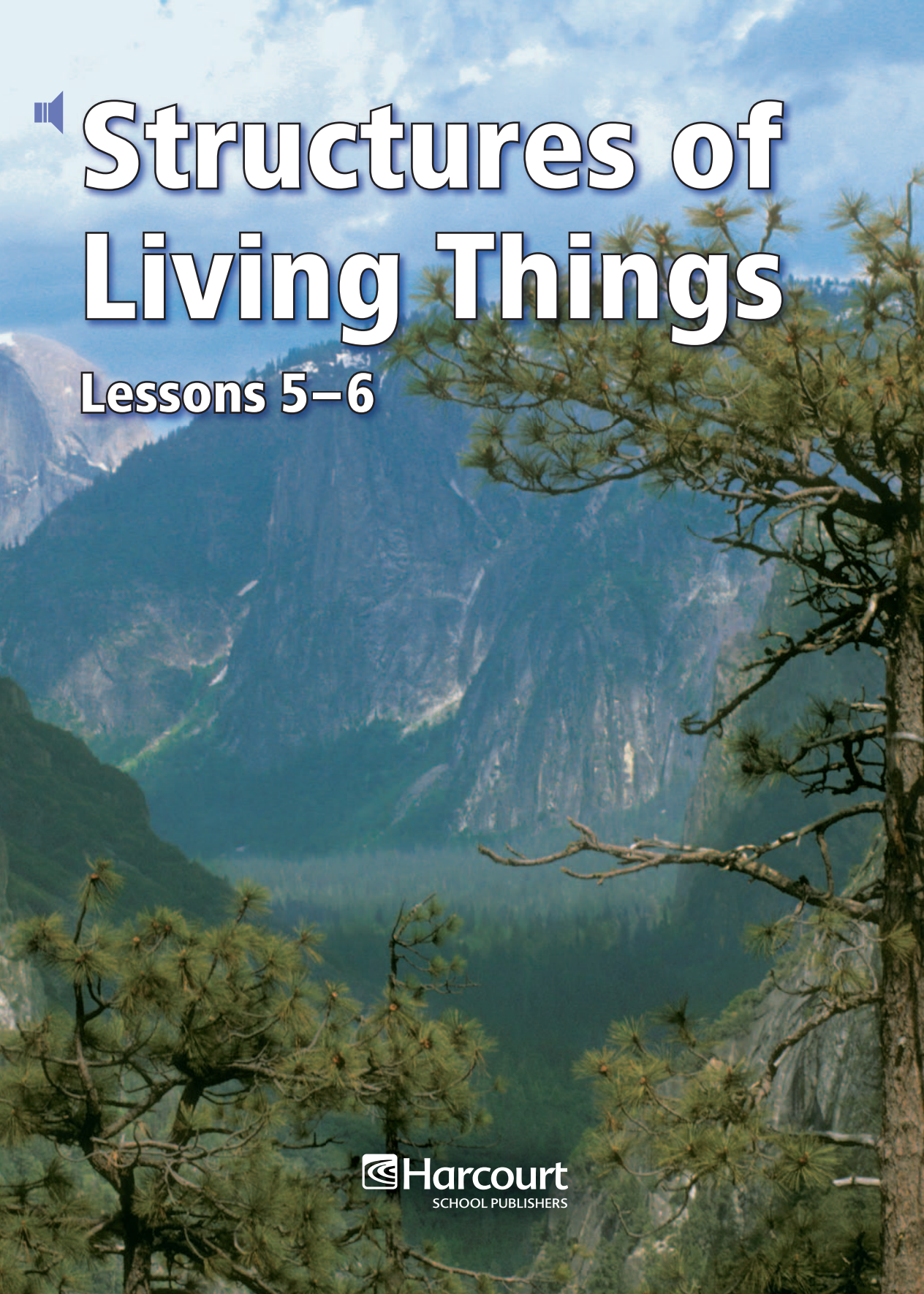
Structures of Living Things
Lessons 5–6
Harcourt
SCHOOL PUBLISHERS

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Structures of Living Things

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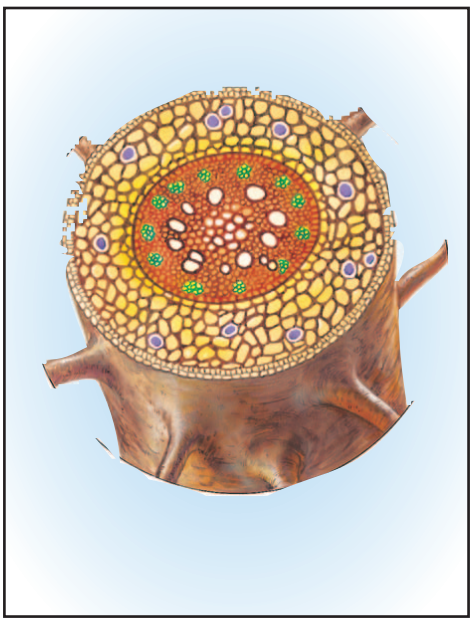
Lesson 5

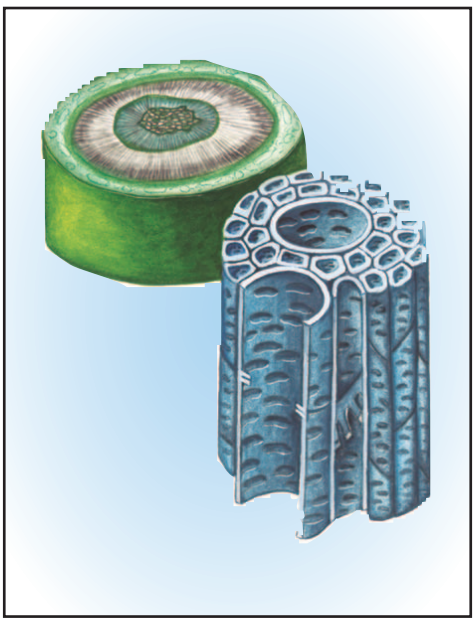
How Are Materials Transported in Vascular Plants?

VOCABULARY

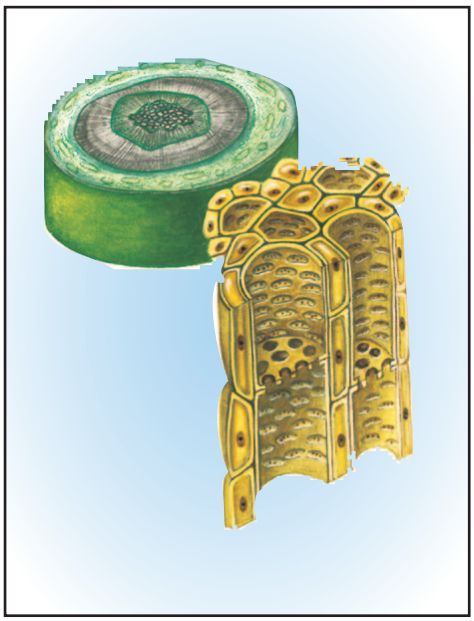
- vascular tissue
- xylem
- phloem



Trees are supported by two kinds of **vascular tissue**. These tubes carry food and water through the plant.



Xylem is a vascular tissue. It carries water and food up from the roots.



Trees also have **phloem**. Phloem carries food from the leaves to the other parts of a plant.

READING FOCUS SKILL

MAIN IDEA AND DETAILS

The **main idea** is what the text is mostly about. **Details** are pieces of information about the **main idea**.

Look for **details** about how materials are moved through plants.

Nonvascular and Vascular Plants

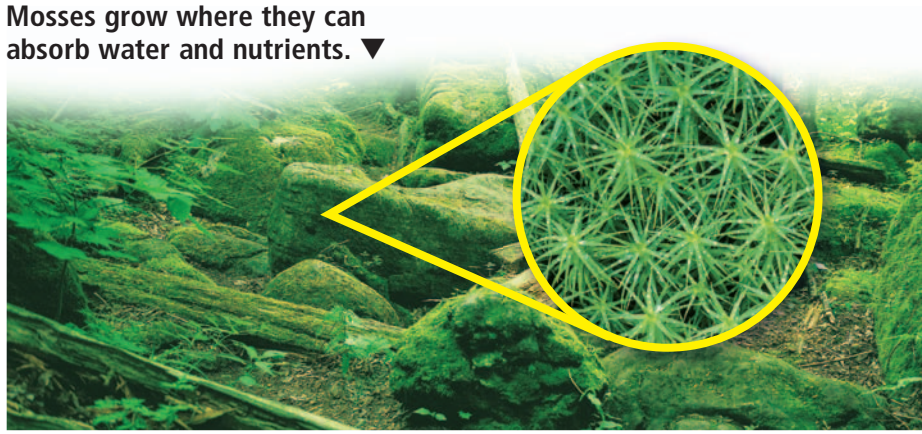
Mosses are *nonvascular plants*. They do not have true roots, stems, or leaves. They do not have tubes for moving nutrients through them. They absorb water from their surroundings.

Trees are *vascular* plants. They are plants with **vascular tissue**. This tissue supports a plant. It carries water and food. Roots, stems, and leaves all contain vascular tissue.

There are two kinds of vascular tissue. **Xylem** carries water and nutrients up from the roots. It brings them to other parts of a plant. **Phloem** carries food from the leaves to other parts of a plant.

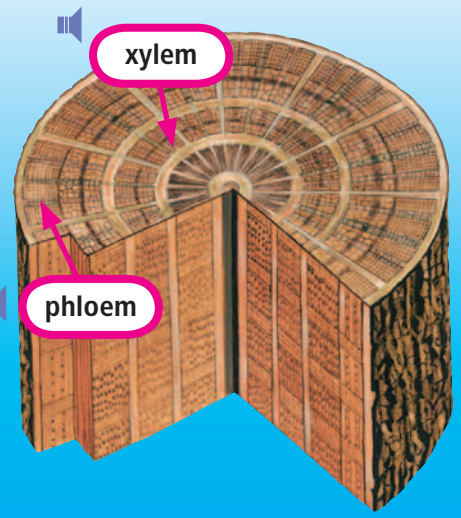
What transport tissues do vascular plants have?

Mosses grow where they can absorb water and nutrients. ▼



New layers of xylem and phloem grow each year.

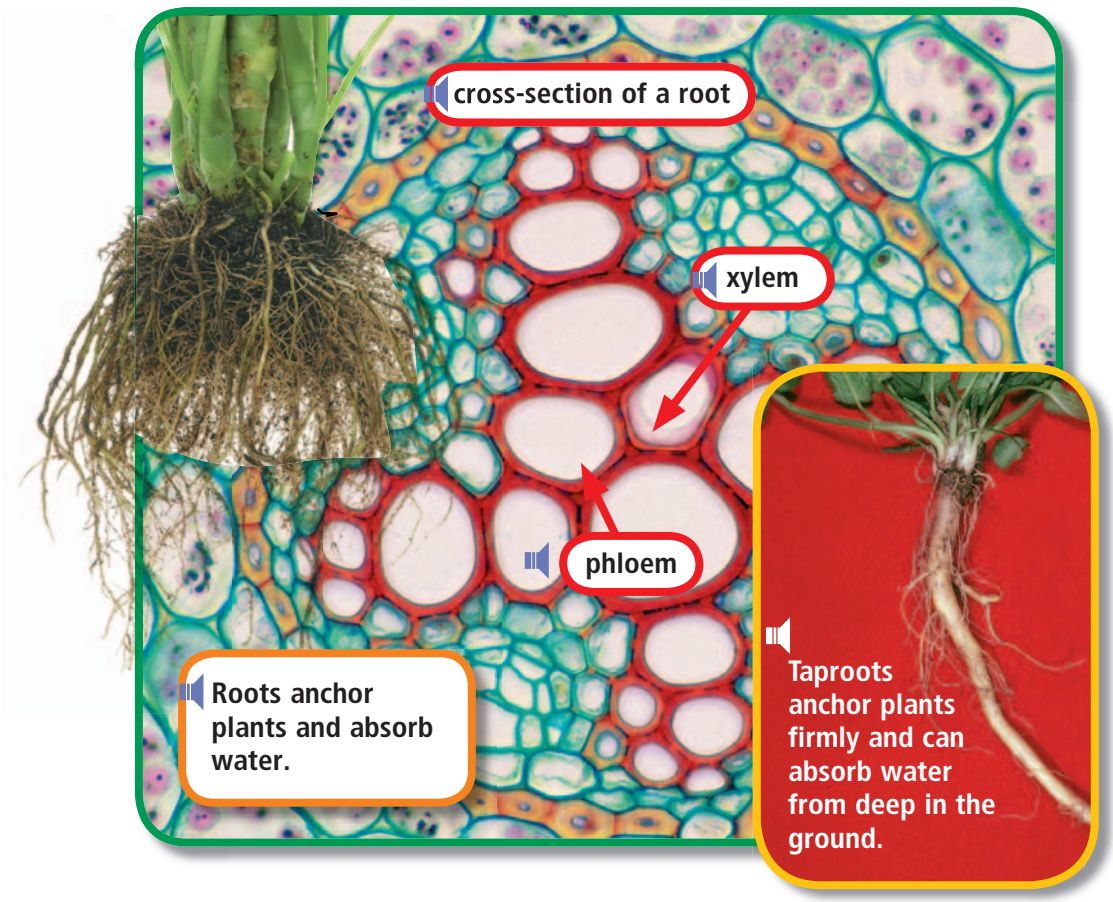
Xylem cells in the trunk of a tree transport water and nutrients. Phloem cells, just under the bark, transport food. Each year, new layers of xylem and phloem grow. You can tell the age of a tree by counting the rings of xylem.



Roots and Stems

Roots and stems have vascular tissue. The tissue absorbs water and nutrients from the soil. How does this happen? Tiny hairs on roots absorb nutrients. Xylem cells take water and nutrients from the root hairs. The xylem cells carry them to the stem.

Roots hold a plant in place in the soil. Like roots, stems have vascular tissue. This helps support plants. The xylem and phloem in stems connect to those same tissues in the roots. Together, they move food for the plant between roots and leaves.

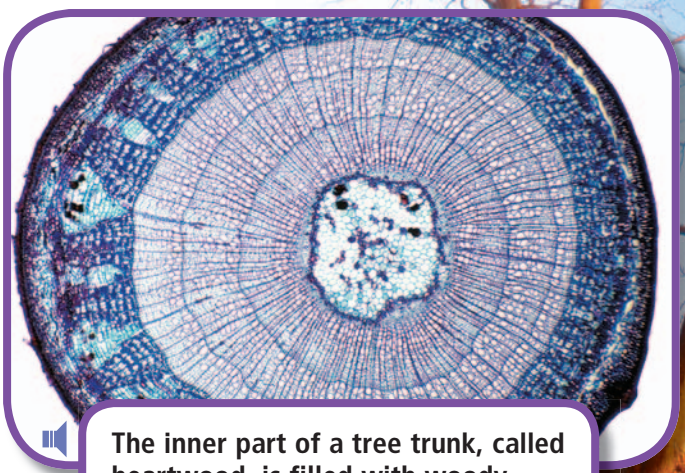


Vascular tissue grows in rings in tree stems and some other plants. In smaller, softer plants, bundles of xylem and phloem are scattered throughout the stem.

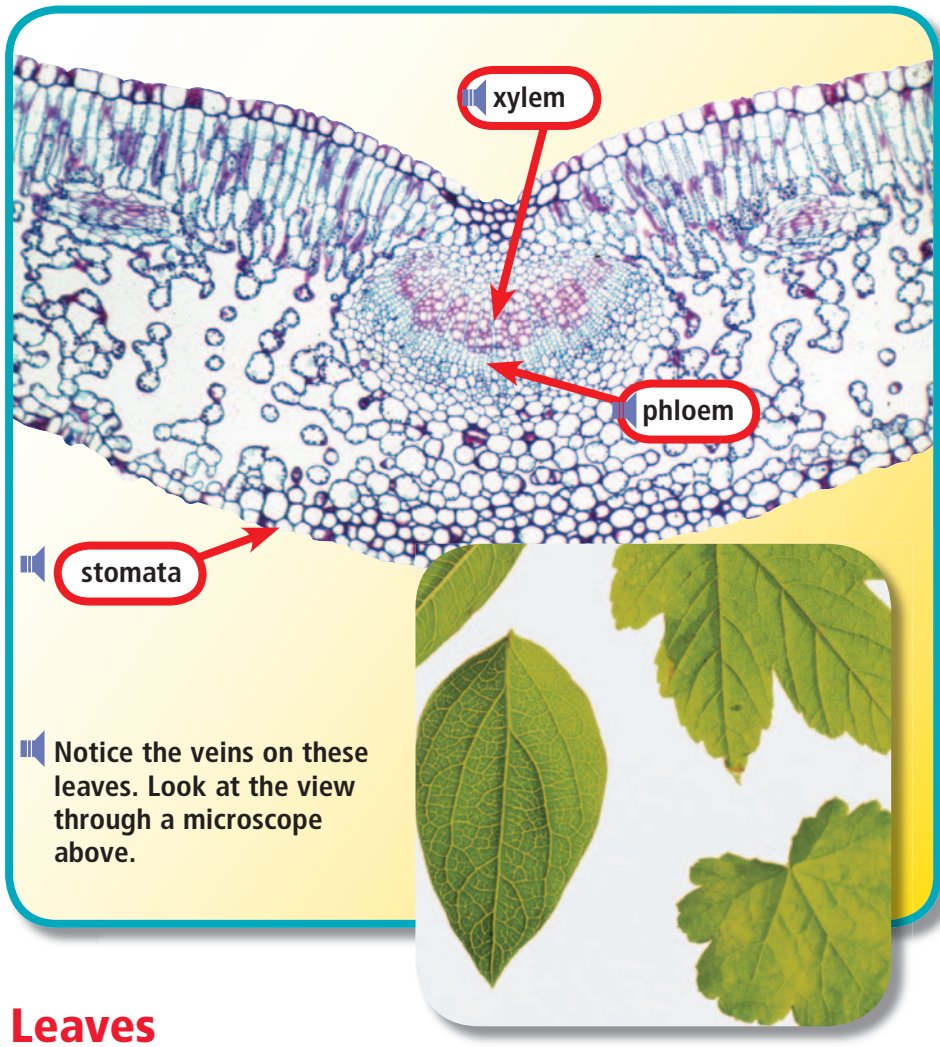
Focus Skill

What is the function of xylem cells?

The inner part of this tree is filled with xylem.



The inner part of a tree trunk, called heartwood, is filled with woody xylem cells. These cells provide support but no longer carry water, as xylem cells in the outer part do.



Notice the veins on these leaves. Look at the view through a microscope above.

Leaves

Leaves use sunlight, carbon dioxide, and water to make sugar. Sugar is made inside the leaf cells. Many leaves are green. The green color absorbs the light energy the leaves need.

Xylem carries water and food to the leaves. Phloem carries the sugar made in leaves to each plant cell. Both xylem and phloem are found in the veins of leaves.

Focus Skill **Where does food making take place in leaves?**

Review

Focus Skill

Complete this main idea statement.

1. _____ _____ carries water and food throughout a plant.

Complete these detail statements.

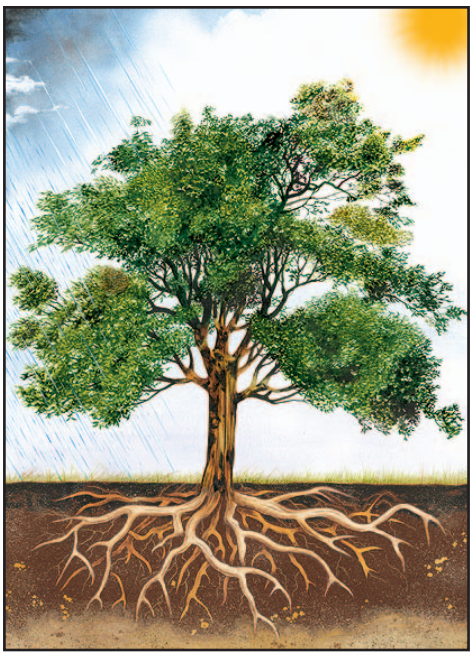
2. _____ carries food and water to leaves.
3. A tree is a _____ plant. It has tubes to carry nutrients throughout it.
4. _____ is a vascular tissue. It carries food from leaves to other parts of a plant

Lesson 6

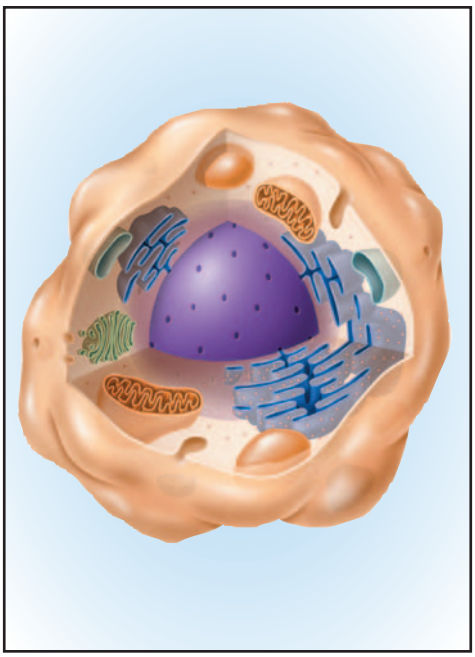
How Do Cells Get the Energy They Need?

VOCABULARY

- photosynthesis
- cellular respiration
- fermentation



Photosynthesis helps plants make food and release oxygen.



Plants "breathe" through **cellular respiration**.

Fermentation is at work when you make bread. It causes bread dough to rise.

Focus Skill

READING FOCUS SKILL

SEQUENCE

When you put things in **sequence,** you put them in order.

As you read, follow the **sequence** of photosynthesis.

Photosynthesis

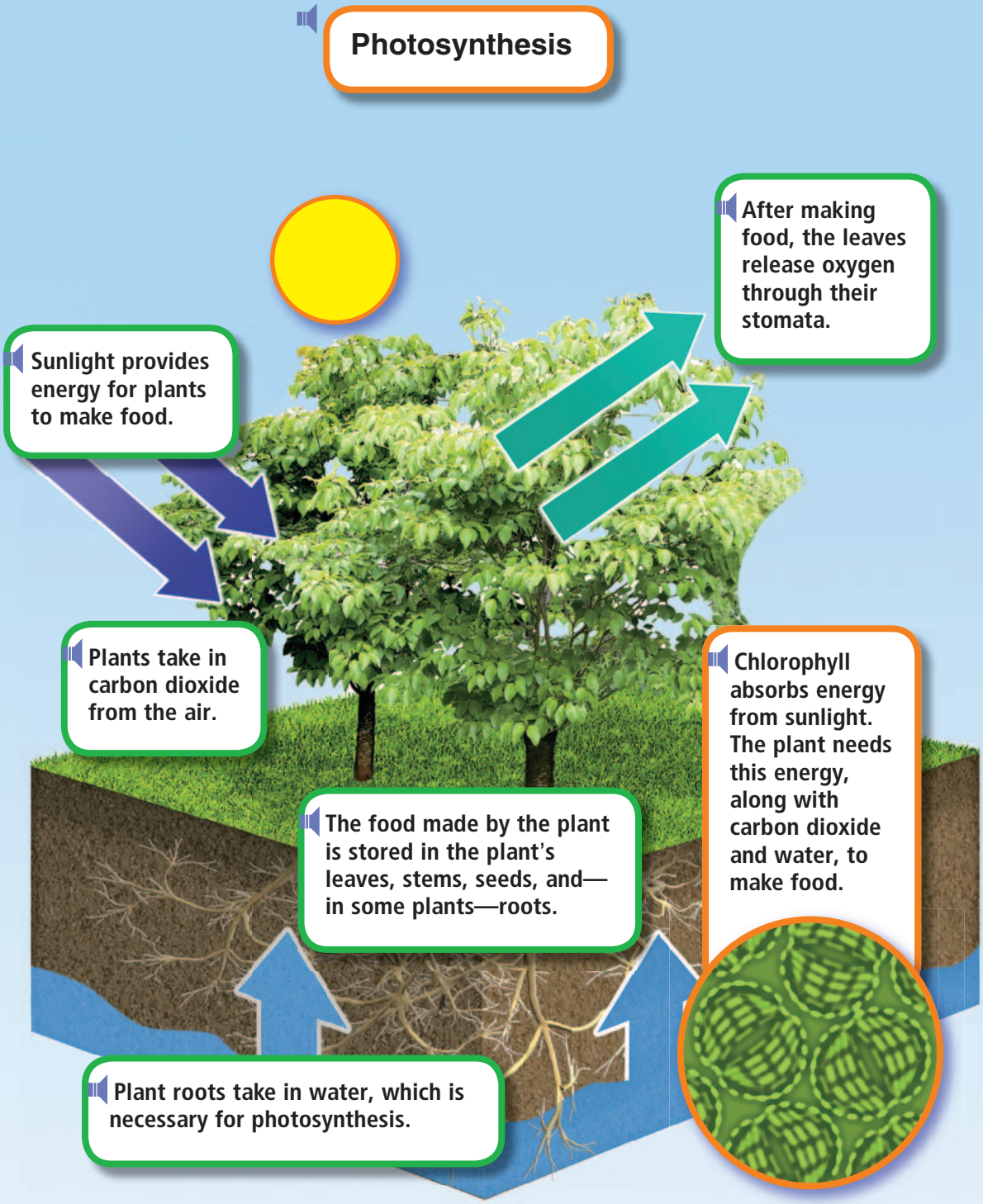
Photosynthesis produces food for plants. Photosynthesis uses water from the soil. It uses energy from sunlight. It also uses carbon dioxide from the air.

Plant cells have chlorophyll. This allows plants to use light energy to make food. Photosynthesis begins when sunlight is absorbed by plants. This energy breaks down the water in plants. Then carbon dioxide combines with a gas from the water. They combine to form a sugar. This sugar is the plant's food.

Photosynthesis also releases oxygen and water into the air.

Focus Skill **When does photosynthesis begin? What happens next?**

Follow the photosynthesis cycle from the sun to plants. ▶


Photosynthesis
After making food, the leaves release oxygen through their stomata.
Sunlight provides energy for plants to make food.
Plants take in carbon dioxide from the air.
Chlorophyll absorbs energy from sunlight. The plant needs this energy, along with carbon dioxide and water, to make food.
The food made by the plant is stored in the plant's leaves, stems, seeds, and—in some plants—roots.
Plant roots take in water, which is necessary for photosynthesis.

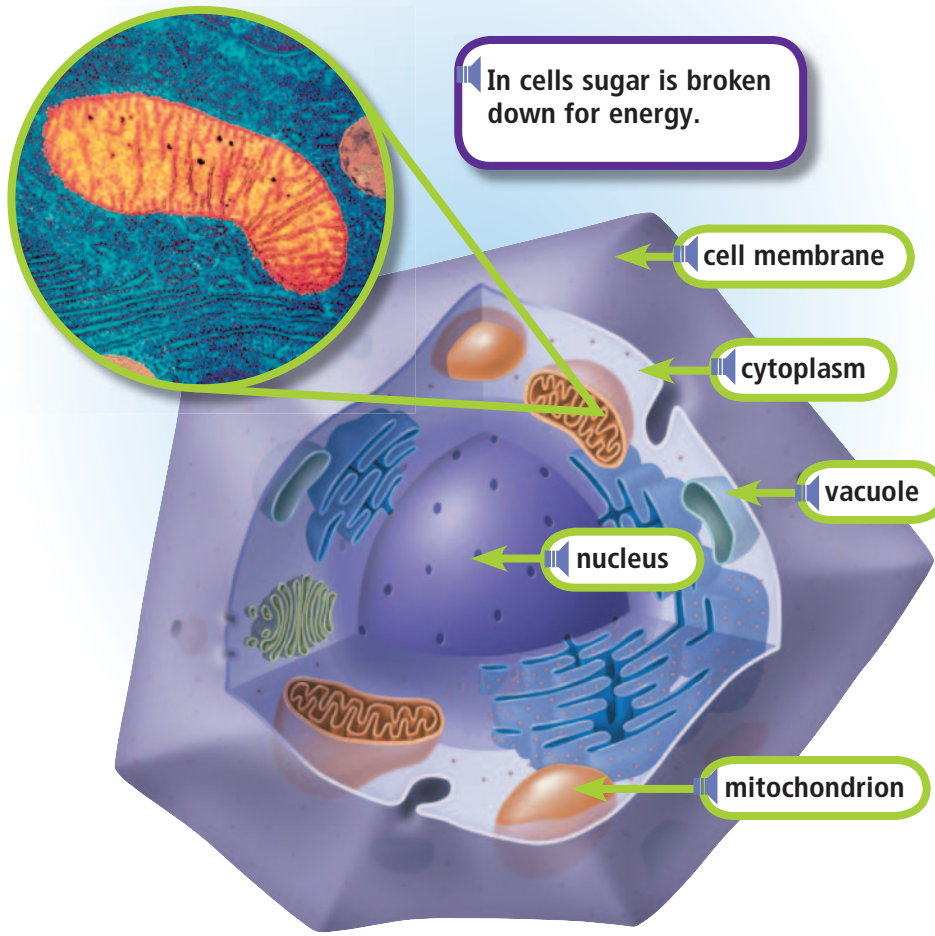
Cellular Respiration

Photosynthesis makes sugar. Then **cellular respiration** breaks down the sugar. Inside the plant cells, the sugar is broken down by oxygen. It is changed into energy. Plants use this energy. Carbon dioxide and water are also produced.

Fermentation also breaks down sugar and releases energy. But it does not require oxygen. Fermentation causes bread to rise by releasing carbon dioxide.

Focus Skill

What is sugar broken down into?



The Carbon-Oxygen Cycle

Carbon and oxygen are always being recycled through the environment. This cycle depends on two things. These things are photosynthesis and respiration. During photosynthesis, plants take in carbon dioxide. Plants store the carbon from carbon dioxide as food. Then they release oxygen.

During cellular respiration, oxygen helps break down food. Energy is released from food. Also, carbon dioxide is released into the environment.

Focus Skill

How does carbon dioxide move through the environment?

Review

Focus Skill

Complete these sequence statements.

1. Photosynthesis begins when _____ is absorbed by plants.
2. Plants store _____ as food.
3. Fermentation breaks down _____ and releases energy.
4. During cellular respiration, sugar is broken down by _____ .

GLOSSARY

cellular respiration [SEL•yoo•ler res•puh•RAY•shuhn] The process by which cells use oxygen to break down sugar to release energy.

fermentation [fer•muhn•TAY•shuhn] The process that releases energy from sugar in the absence of oxygen.

phloem [FLOH•em] Vascular tissue that carries food from leaves to the other parts of a plant.

photosynthesis [foht•oh•SIN•thuh•sis] The process by which plants make food from carbon dioxide and water and release oxygen into the air:

vascular plant [VAS•kyuh•ler PLANT] A plant with tubes to carry nutrients and water throughout the plant.

xylem [ZY•luhm] Vascular tissue that carries water and nutrients from roots to the other parts of a plant.

Think About the Reading

1. What can you do to help you remember what you have learned?
2. What questions do you have after reading this book? How can you find the answers?

Hands-On Activity

Use a cotton ball to show how plants absorb moisture.

1. Slowly dip a cotton ball into a glass of water.
2. Observe as the water is absorbed. The cotton fibers will look like root hairs soaking up water.

School-Home Connection

Explain to a family member what you learned about plants. Ask that person if he or she knows how plants make food. Together draw a diagram showing how plants make food and release oxygen.