

Lesson 2

The Nature of Trees



Objectives:

1. To understand what parts make up a tree.
2. To understand what function each part serves.
3. To understand the relationship between the function and parts of a tree and those of humans.

Subjects:

1. Botany
2. Human Physiology
3. Art



Vocabulary:



Focus:

1. Establish the value of trees by having the students list on the board the benefits that trees provide. Examples are illustrated below:

- They provide shade and cool places.
- They provide beautiful areas for relaxing, camping, and hiking.
- They release oxygen into the air.
- They clean the air by taking in carbon dioxide from the air and store carbon in their structures.
- Their roots keep dirt from washing away.
- Fallen leaves and branches and dead trees decompose and enrich the soil.
- Leaves on both the branches and on the ground slow down the rainfall which helps the ground absorb moisture.
- Trees provide homes and food for wildlife and humans.
- They provide thousands of useful products which we use every day to make our lives better and more enjoyable.

CONTINUED ON REVERSE SIDE

1. **Bark:** the protective outside covering of a woody stem or root.
2. **Phloem:** layer of inner bark cells that transport food made by photosynthesis in the leaves to the rest of the plant.
3. **Cambium:** thin layer of living cells that produce a new layer of wood each year, forming tree rings, which we can count to tell the age of a tree. The cambium lies between the xylem and phloem layers.
4. **Cellular Respiration:** the chemical breakdown of glucose to produce energy. This process is the opposite of photosynthesis.
5. **Sapwood:** newly formed wood cells that lie just inside the cambium. It acts as a major conductor of water and minerals for the tree; also known as **xylem**.
6. **Heartwood:** the hard, inactive wood at the center of the tree.

7. **Roots:** the network below ground that anchors the tree in the soil. Root hairs push their way through the soil and absorb moisture and minerals from the soil.
8. **Chlorophyll:** the green substance found in leaves and needles that captures the sun's energy.
9. **Photosynthesis:** the process of channeling energy from the sun by means of chlorophyll and converting the carbon dioxide in the air to produce nutrients for the tree and oxygen that is released into the atmosphere.
10. **Oxygen:** an element found freely in nature that is needed for humans and animals to be able to breathe and is necessary for nearly all combustion to occur.
11. **Carbon Dioxide:** a colorless, odorless gas that is formed during respiration, combustion, and organic decomposition.

VOCABULARY

- Establish the concept of photosynthesis by identifying the Greek words “photo” (light) and “synthesis” (to put together) as the basis of our word for this process. Ask the students to guess what this word might mean.
- Establish that trees and people are perfect partners by discussing the process of photosynthesis. Have each student draw his own circular flowchart as you illustrate a large one, such as the one provided at the end of this lesson, on the board. There are information bubbles for each phase. Have the class draw arrows from one phase to the next, with the last arrow returning to the first phase. Write down and discuss parts of the photosynthesis equation (page 9).
- Establish how people and trees share things in common by discussing how different parts of trees serve different functions, as different parts of our bodies serve different functions for us.

If the needles and leaves take in and get rid of carbon dioxide and oxygen, what part of the human body are they like?

- The lungs*

Our human skeletons support our bodies. What supports a tree?

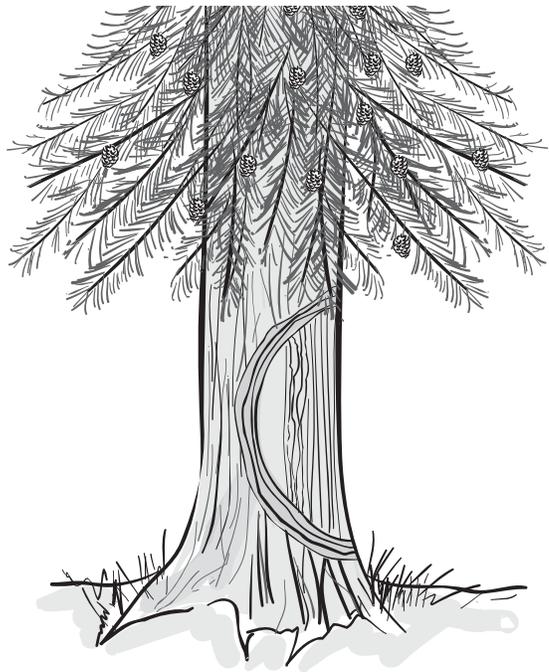
- Its trunk (its heartwood); its roots*

What system handles nutrients (food) and water for a tree?

- The needles and leaves produce food by photosynthesis.*
- The xylem transports water.*
- The phloem transports food.*
- The roots absorb water and send it up the tree for growth.*

What system handles food and water supplies for humans?

- Our digestive system breaks down nutrients and water.*
- Our circulatory system transports nutrients and water to all cells in our body.*



Enrichment Activity:

- Make separate copies of both sides of the **Wonderful Workings of Wood** activity sheet (page 11 and 12).
- Have the students glue the picture showing the cross section of a tree to construction paper or poster board for support.
- Let the project dry if too wet from enthusiastic gluing.
- Have the students use a glue stick to apply glue to the marked sections of the tree, one section at a time, avoiding the indicated numbers. Lightly sprinkle with the correct coating.

NOTE: To reduce waste during the sprinkling phase of the project, have the students GENTLY shake off the excess coating onto designated paper plates, one for each type of coating. Other students can then make use of these materials.

SUGGESTIONS FOR COATINGS:

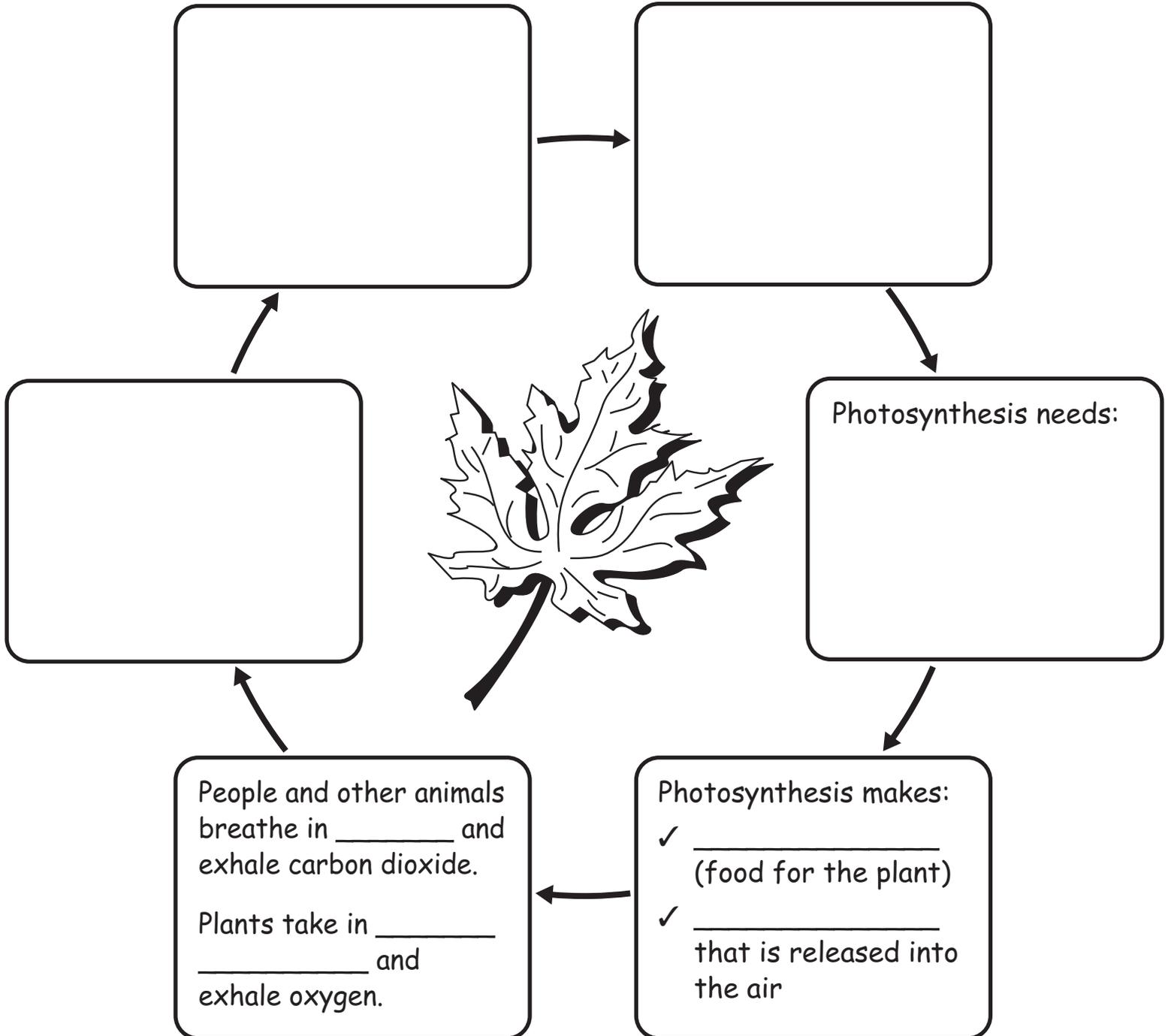
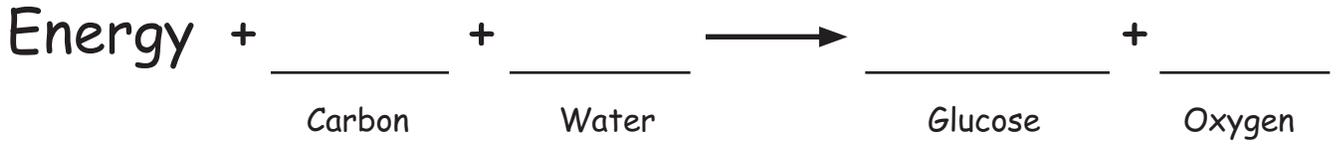
- chocolate baking sprinkles for inner bark
- poppy seeds for outside bark
- sesame seeds or powdered milk for cambium layer
- yellow baking sprinkles or powdered mustard for sapwood layer
- paprika, cinnamon, or chili powder for the heartwood
- green baking sprinkles or green sugar crystals for the needles



Name _____

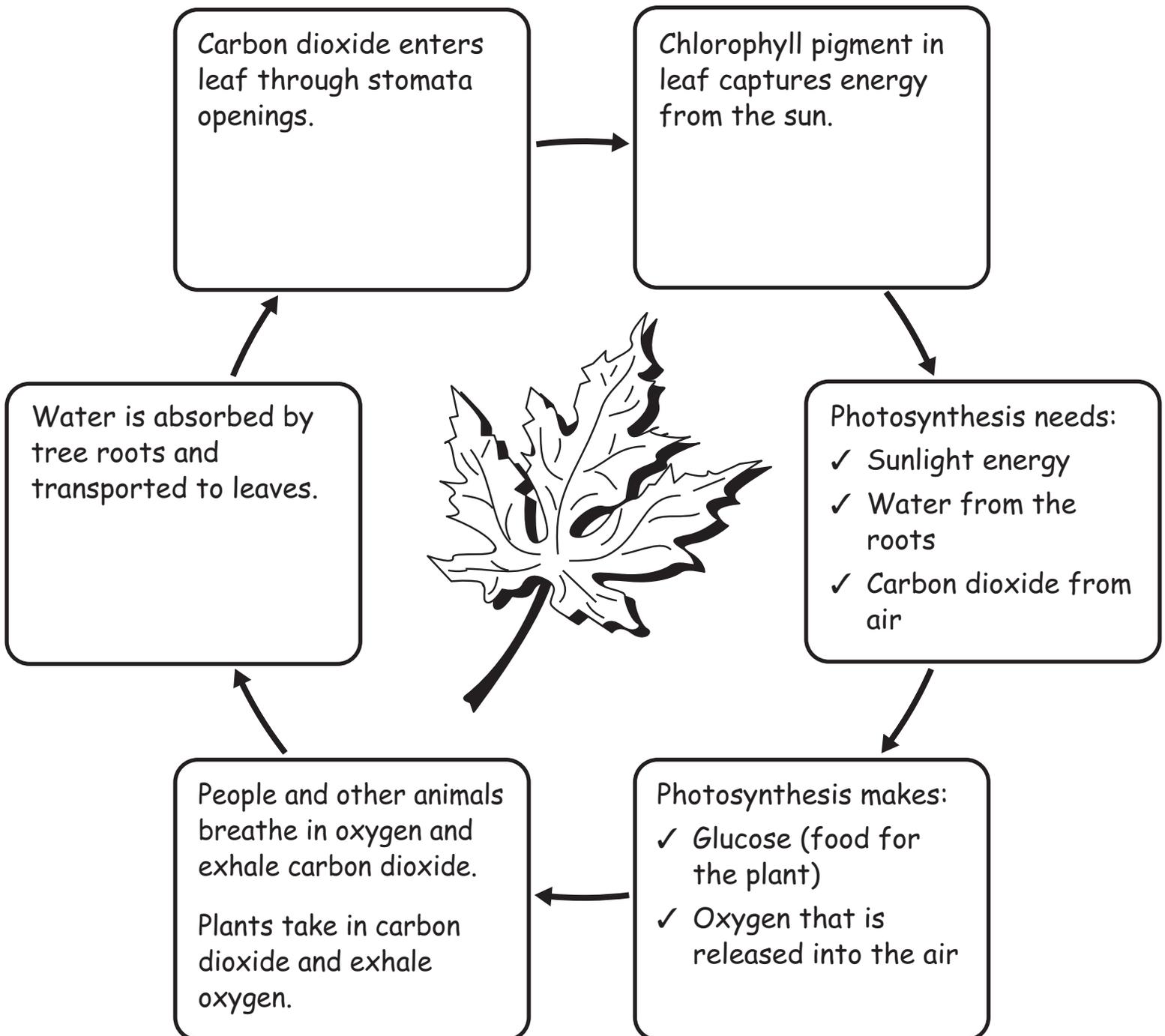
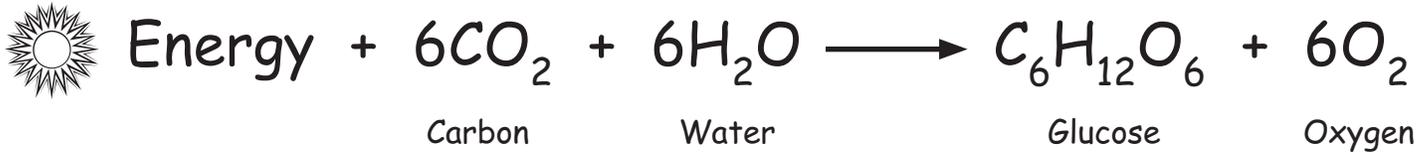
Photosynthesis Flow Chart

Photosynthesis Equation:



Photosynthesis Flow Chart

Photosynthesis Equation:



The Wonderful Workings of Wood



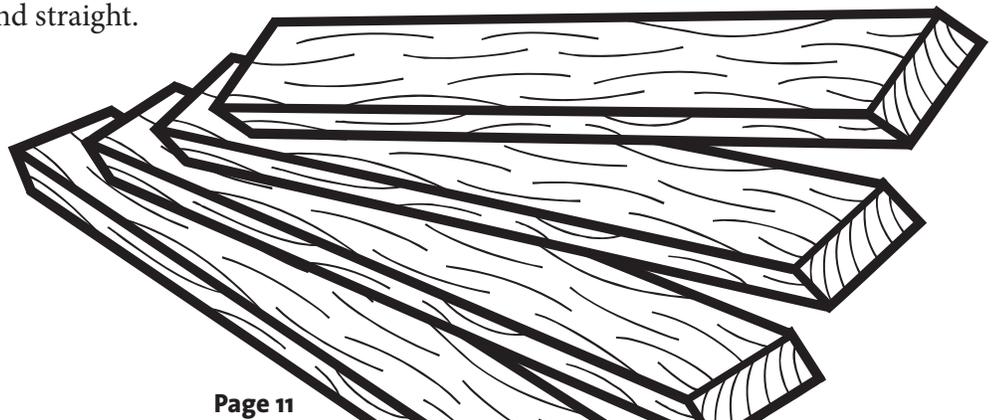
Most people think that wood is just one thing. Actually, wood is made up of different parts, each with its own job. Use this numbered guide to discover what the parts of a tree are called and what job each part does. The guide will also act as your legend for the texture picture that you will find on the next page.

- 1. OUTER BARK** is like your skin. It protects the tree from outside damage.
- 2. INNER BARK** (Phloem) brings the food that is produced in the leaves to the rest of the tree, where it is used for growth or is stored.
- 3. CAMBIUM** is made from clusters of cells that produce new layers of bark each year. These layers are called rings. Starting with the heartwood, we count the dark rings to tell the age of the tree.
- 4. SAPWOOD** (Xylem) is the highway that carries minerals and water to all parts of the tree. The chemicals in the sap are what determine the color that leaves turn in the fall.
- 5. HEARTWOOD** acts as our spine does. It gives strength to a tree and helps it to stand straight.

When we look at a slice of wood, it not only helps us tell the age of a tree, it also tells us about its history. We can see when and where insects invaded and made holes and tunnels in it. We can see when and where fire scarred it. We can even tell which years have been wet years and which ones were drought years. Thick rings show plenty of moisture; narrow rings show little moisture. Narrow growth rings may indicate that the trees were overcrowded. Removing some trees from the forest will reduce competition so the remaining trees can grow faster and will be healthier overall.

What do foresters do if they want to know the age of a tree that has not been harvested? They often use a tool called an increment borer. It looks a little bit like a drill. Foresters use it to pull a small plug of wood from the tree, somewhat the way we use a corkscrew to remove a cork from a bottle. They can then read the rings from the tree plug just the way they might with a wafer of wood from a limb or from a tree stump.

The next time you see a tree stump, read the rings. What history does it have to tell?





Name _____

