



# TREE FACTORY

## GRADES 3-5

### OVERVIEW

A tree is composed of many parts: leaves, trunk, branches, heartwood, sapwood, cambium, phloem, bark, and roots. In this activity, students will act out parts of the tree to see how they each play a role in helping the tree function, much like a factory.

The book “Hands-on Nature: Information and Activities for Exploring the Environment with Children” offers up this great way to introduce this activity:

*“Bring in a sapling hidden inside a cardboard box. Tell the children that you’ve discovered a marvelous machine that runs by sun power, has an automatic humidifier and thermostat, manufactures its own food, cleans the air, is strong enough to split a rock, and is beautiful. What could it be? Present the sapling, then use it and pictures to introduce the characteristics and functions of the different parts of a tree.”*

### BACKGROUND INFORMATION

Familiarize yourself and students with the parts of a tree. Minnesota DNR’s Forest Treasures website provides a great overview:

<http://www.dnr.state.mn.us/forestry/education/foresttreasures/partsofatree.html>

1. Leaves
2. Trunks and Branches:
  - a. Heartwood
  - b. Sapwood (Xylem)
  - c. Cambium
  - d. Phloem
  - e. Bark
3. Roots
  - a. Lateral roots
  - b. Taproot
  - c. Root hair

## Parts of a Tree

Trees have three main parts—crowns (canopies), trunks, and roots. Each part has a special job to do in keeping the tree healthy and growing.

**The trunks of most trees are made up of five layers. These layers are:**

**Outer Bark:** This is the “skin” of hard, dead tissue that protects the living inner parts of the tree from injury.

**Inner Bark (Phloem):** This layer’s tiny pipelines move the food made by the leaves, called sap, to other parts of the tree.

**Xylem (Sapwood):** A narrow band of cells at the out-most edge of the inner wood that conducts water and minerals throughout the tree, from the root system toward the leaves.

**Cambium:** A thin layer of growing tissue on the outside of the xylem. Its job is to make the trunk, branches, and roots grow thicker.

**Inner Wood (Heartwood):** Woody, nonconducting tissues in the center of the tree that store growing compounds and sugars and support the tree.

**Crown (Canopy)**

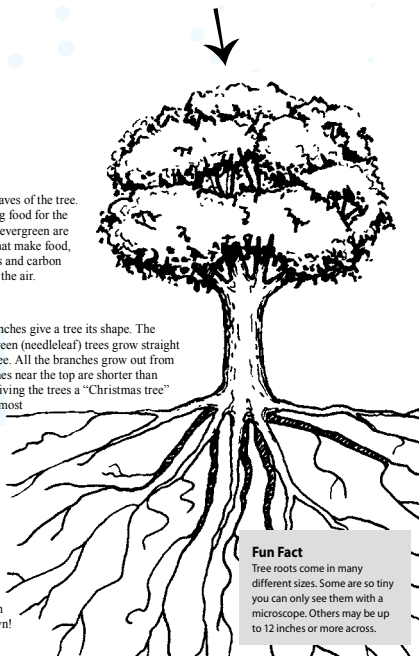
The crown is the branches and leaves of the tree. It has the important job of making food for the tree. The leaves (the leaves of an evergreen are its needles) are tiny “factories” that make food, using water absorbed by the roots and carbon taken from the carbon dioxide in the air.

**Trunk**

The trunk and its branches give a tree its shape. The trunks of most evergreen (needleleaf) trees grow straight up to the top of the tree. All the branches grow out from the trunk. The branches near the top are shorter than those farther down, giving the trees a “Christmas tree” shape. The trunks of most broadleaf trees do not reach to the top of the tree. Instead, the trunk divides into spreading branches, giving the crown a rounded shape.

**Roots**

Roots hold the tree in the ground and absorb water and minerals that the tree needs to make food. Roots often spread much farther than the crown of the tree. Large, woody roots grow horizontally (side to side), mainly in the top 12 inches of the soil and usually no deeper than 3 to 7 feet. They often stretch out from the trunk to take up a space four to seven times larger than the crown! These roots spread across an area that can be twice the height of the tree.



**Fun Fact**  
Tree roots come in many different sizes. Some are so tiny you can only see them with a microscope. Others may be up to 12 inches or more across.

## PREPARATION AND MATERIALS

- Yarn
- Scissors
- 30 slips of paper
- Paper bag

Make four branches for your tree by cutting yarn into four 6-foot lengths. Find a large open area that allows students to spread out where they can build the tree.

Write the following parts of a tree on separate slips of paper and put them in a sack. The following numbers are for a group of 30 students. Adjust accordingly for larger or smaller groups.

- 1 – Heartwood
- 3 – Sapwood (Xylem)
- 1 – Taproot
- 2 – Lateral roots
- 5 – Cambium
- 6 – Phloem
- 8 – Bark
- 4 – Leaves

## ACTIVITY

1. Tell the students they are going to create a tree by acting out the parts of the tree they discussed. Have each student select one slip from the bag. Then take the students to the designated area where they will be building the tree.
2. Ask the students what part of the tree makes up the center and provides the tree with strength and support (heartwood). Have the student who is acting as heartwood stand in the center of the open area, tighten their muscles, and chant, “I support; I support.”
3. Ask the students what part of the tree transports water to all parts of the tree (sapwood/xylem). Have the students acting out sapwood join hands to form a small circle around the heartwood. Have these students chant, “Gurgle, slurp. Gurgle, slurp. Transport water,” as they raise their joined hands up and down.
4. Ask the students where the water in the sapwood/xylem comes from (roots). Have the student who is acting as taproot sit down with their back against the sapwood. Then have the students acting as the lateral roots lie down on the ground with their feet toward the sapwood and their arms and fingers spread out to represent root hairs. Have the roots make sucking noises.

5. Ask the students where the water in the sapwood travels (the leaves). Have the heartwood hold the ends of the four pieces of yarn that you cut earlier. Give the other end of each piece to the students who represent leaves. Ask the leaves what they do all day (photosynthesis- make food!). Have the leaves flutter their hands and chant, “We make food; we make food.”
6. Ask the students what happens to all the food that is made using sunlight, air, and water (transported throughout the tree). Ask everyone what part of the tree transports the food from the leaves to the rest of the tree (phloem). Have the students acting as phloem join hands and form a large circle around the tree. Then have them reach their hands above their heads grabbing (for food), and then squatting and opening their hands (releasing food) while chanting, “Food to the tree!”
7. Ask students what layer produces new sapwood and phloem to keep the tree growing and healthy (cambium). Have the students playing cambium form a circle between the phloem and the sapwood. Have them sway side to side while chanting, “New phloem, sapwood, and cambium.”
8. Ask students what final component of the tree is missing (bark). Have the students acting as bark lock arms and form a circle that faces out from the center of the tree. Have them make a tough face and march in place while chanting, “We are bark. Please keep out!”
9. When the tree is completely assembled, have all of the students act out and chant their parts simultaneously.

#### **FOLLOW-UP QUESTIONS AND ACTIVITIES**

- How does a tree function like a factory?
- What would happen if you took (name a part) out of the tree?
- How does a tree get water?
- How does a tree get food?
- What protects the tree?
- How does a tree get rings?
- How do trees survive harsh weather conditions?
- Write a descriptive paragraph describing how a tree functions. Be sure to include all of the parts we discussed and acted out.
- Compare and contrast parts of your body to parts of a tree.

#### **OPTIONAL EXPANSION ACTIVITY**

Tree Cookies: <https://www.plt.org/family-activity/tree-cookies/>

Adapted from “Project Learning Tree Environmental Education Activity Guide” and “The Wonder of Trees: Nature Activities for Children.”