

Forest Through the Trees

Objective: To teach students the basic anatomy of trees and how different cells function to promote tree survival.

Materials:

- Paper
- Markers/Crayons
- Tree Anatomy Labels
- Tree Cookie examples
- White Paper Plates
- Plastic Poker Chips (Red, Blue, and White)
- Celery
- Peanut Butter
- Raisins

10 minutes; Tree Anatomy

Ask students to draw a tree and label as many parts they can within a certain time frame, usually 2 to 3 minutes. Students can then each name one part out loud for the group to discuss.

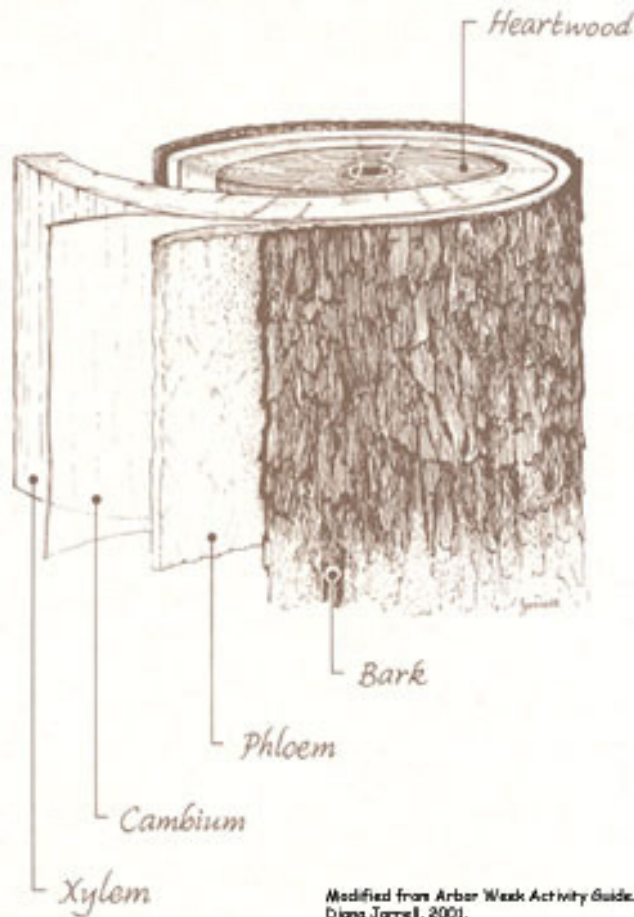
20 minutes; “Tree Factory”

Students will be participants in a demonstration to show how different parts of a tree function to support growth and survival. Explain that all parts of the tree are important and must work together to provide essential requirements to the tree.

Terminology:

1. **Leaves:** the food factory of the tree. Using energy from the sun, leaves convert carbon dioxide and water into oxygen and sugar (food!) through a process called photosynthesis. Gases are taken in and exit through tiny stomata on the underside of the leaf. Through these same tiny holes, water vapor exits in a process called transpiration.
2. **Trunk:** the trunk provides the support for the branches of the tree, which in turn support the tree’s leaves. The trunk contains tubes in which nutrients, sugars, and water are transported throughout the tree. These tubes are contained in layers, as described below.
 - a. **Heartwood:** forms the central core of the tree. Made of dense hard wood and provides strength for the tree.

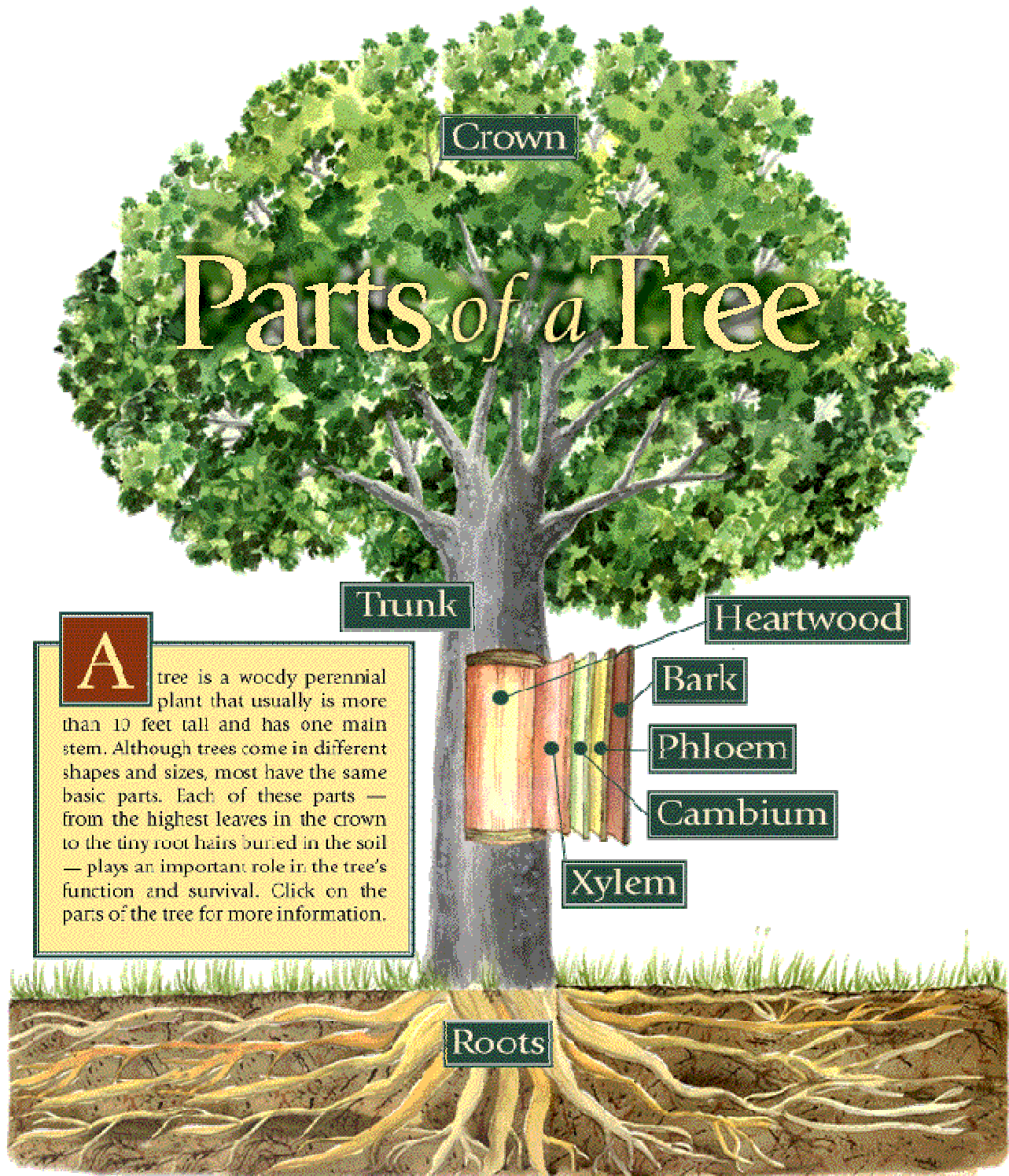
- b. Xylem: also called sapwood, brings water and nutrients up from the roots to the leaves. Older xylem cells become part of the heartwood.
- c. Phloem: also called the inner bark. Carries sap from the leaves to the rest of the tree. May also transport stored sugars from the roots up to the rest of the tree at certain times of the year.
- d. Cambium: a very thin layer of growing tissue that makes the cells that become new xylem and phloem.
- e. Bark: protects the tree from injury caused by insects, animals, other plants, disease, and fire.



Modified from Arbor Week Activity Guide.
Diana Jamell, 2001.

- f.
3. Roots: help anchor the tree in the ground. The trees roots also absorb water and nutrients from the soil to be transported to other parts of the tree, including leaves and branches. There are several types of roots, including a taproot which grows straight into the ground, lateral foots that grow away from the tree, and tiny root hairs that are very fine and can absorb up to 95% of the water and nutrients absorbed by the tree. The tree's root mass can extend many feet into the ground and span several feet across depending on the height and size of the tree.

Parts of a Tree



“TREE FACTORY” ACTIVITY:

1. Write the following parts of a tree on slips of paper and place into a container. Have students choose a slip at random; this will be their part in the demonstration. Numbers represent how many you will need for a large group, alter if needed.
 - a. Heartwood (1)
 - b. Xylem (3)
 - c. Lateral Roots (2)
 - d. Cambium (5)
 - e. Phloem (6)
 - f. Bark (8)
 - g. Leaves (4)
2. In a large, open area start the role-playing activity. The heartwood student stands in the center of the area and says repeatedly “I support.”
3. Have the leaves stand around the heartwood with arms raised. Ask them to flutter their hands and say, “We make food, we make food.”
4. Next ask the xylem students to join hands around the heartwood and leaves to form a small circle. Have students make sounds indicating the uptake of water and nutrients while moving arms up and down in a pumping action.
5. Ask the cambium students to form a circle around the xylem and sway, saying “New xylem, new phloem.”
6. Next comes the phloem, have the phloem students form a large circle around the tree. Ask them to raise their arms and make grabbing motions toward the leaves (for food) and bend down to open their hands (release food) to simulate the role of a tree’s phloem.
7. Ask the root students to sit at the bottom of the tree with their backs to the phloem and legs straight out. They will now make sucking noises to simulate uptake of water and nutrients from the soil.
8. Last is the bark. Ask the bark students to stand around the entire tree facing out. Ask them to simulate being the protectors of the tree, with a mean look on their faces.
9. Lastly, have all parts of the tree act out their roles simultaneously to demonstrate how all roles must be completed to support the life of the tree.
10. After the demonstration, ask the students to comment on what they learned from the role-playing activity.

10 minutes; Be Your Own Tree Activity

On a white paper plate, ask students to draw their own tree cookie to represent how old they are. Students can label rings to indicate important events in their lives. Bring an example of your own tree cookie to show.

10 minutes; Every Tree for Itself Activity

Ask students to discuss the different growth requirements of a tree, such as water, nutrients, and light. Then ask students to place their paper plate tree cookies on the ground, equal distance apart, and stand feet together on the plate. Drop equal amounts of red, blue, and white poker chips on the ground around the students to represent food, water, and light. Have the students, at the same time, grab for the chips to simulate competition for growth requirements between trees.

Repeat the exercise using a limited number of chips for either food or water. This will represent years of drought, etc. Those trees that did not get at least one of each color will die and must leave the forest.

Next repeat the game again to represent shading. This time, limit the amount of light chips you drop and ask the students to stand closer together. This demonstrates a tree's competition for adequate light. Again, a tree that does not get all the colors of chip must leave the forest.

10 minutes; Bumps on a Log

Using celery topped with peanut butter, the students can place raisins on top to create "Bumps on a Log" and enjoy a healthy snack!