



Science Unit: *Temperate Forest*
Lesson 10: *Making a Human Tree**

School year: 2004/2005
Developed for: Lord Selkirk Annex Elementary School, Vancouver School District
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Grade level: Presented to grades 1 - 2; appropriate for grades 1 – 3 with age appropriate modifications.
Duration of lesson: 1.25 hours
Notes: *This lesson is from B.C. Ministry of Forests. Forests in Focus, pp. 24-29. "How does a tree work?"

Objectives

1. Learn components of a tree and their specific functions. Students role-play parts of a tree including bark, phloem, cambium, sapwood (xylem), heartwood, roots and leaves.

Background Information

Trees are perennial plants usually with a single woody stem (trunk). Tree roots anchor the tree and absorb water and nutrients from the soil. The crown is the upper portion of the tree, which includes all the leaves and branches. Looking at a cross-sectional piece of the tree trunk, one may see a number of tree parts, each with a specific function. The heartwood is made of inactive xylem cells, filled with resin, and provides the tree with strength and support. The sapwood (active xylem) transports water and nutrients from the roots to the leaves. The cambium is the living and growing part of the tree, which produces new phloem and xylem cells each year. The phloem or inner bark transports sugars made in leaves to the rest of the tree. Finally, the outer bark protects the tree from insects, fungi, fire and drying out, much like skin is a protective barrier in humans.

Vocabulary

Bark: Outermost layer of stem (trunk), made of dead cells, which protects inner parts of a plant.

Phloem: Layer of cells inside the bark, which act as tubes, carrying sugar (sap) made in leaves, to other parts of a plant.

Xylem: Tube cells, which carry water and dissolved minerals from roots to leaves in a plant.

Cambium: Only growing layer of (stem) trunk which produces new phloem and xylem cells in a plant.

Sapwood: The younger outer layer of wood in tree trunk, containing xylem cells for carrying water and minerals from roots to leaves.

Heartwood: Oldest, inner layer of wood in tree trunk, made of inactive xylem cells, giving the tree strength and rigidity.

Roots: Underground part of a plant which anchors it to the ground and absorbs water and minerals from soil.

Crown: Upper portion of a tree, including branches, twigs and leaves.



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Materials

- Leaves as props
- 2 twigs as bark beetle props
- Paper
- Markers

In the Classroom

Introductory Discussion

Ask students to name all of the parts of a tree. Expand upon their knowledge through the review of vocabulary words and the function of different parts of the tree.

Science Activity/Experiment

1. Get students to break into groups of 3-4 and assign a tree part (shown below, Section 3). Students have paper and marker to write their tree part and then brainstorm as to what is the function of that part.
2. When students have finished brainstorming, gather together to make a “live” tree.
3. Divide students into the following groups:
 - Heartwood: (2-3 students standing with backs together, facing out.) “You are the oldest part of the tree, so old you are dead. All your xylem has filled with resin. Your job is to stand strong and tall.”
 - Roots: (4 students lying down feet touching heartwood, heads away from center. Students with long hair, spread the hair out like small roots.) “You act as an anchor even in windy places. You suck up water and nutrients from the soil. Imagine you are holding the tree to the ground and sucking through a straw. “Slurp!”
 - Sapwood: (4 students, standing, facing heartwood, holding hands) Be careful not to step on the roots. Your job is to take water and nutrients from the roots to the leaves. You can lift hundreds of liters every day using your efficient pump. “Suck up water!” Kneel and then stand up saying “ wheee”.
 - Cambium/Phloem: (3-4 students form a circle outside the sapwood, alternating with one student facing in, one facing out, holding leaves as props) The cambium is the growing part of the tree. The phloem makes food using leaves, then brings the food down. “Let’s make food.” Shake your leaves with arms extended, feeling the sunlight on your leaves. Then bring food down (drop your arms and bend down to the ground saying “whoooo”).
 - Outer Bark: (3-4 students make a circle outside phloem facing outwards, linking arms and looking tough). What does the tree need next? What do we need to protect the tree from? (fire, insect attacks, fungi, extreme temperature changes). “Bark, get tough!”
 - Bark Beetle: Choose one student at beginning of activity to be a bark beetle. Ask tree students if they hear a whine. Ask remaining student to go and check out sound behind a desk. He/She comes back as a bark beetle with sticks as antennae and tries to get through the outer bark.
4. Practice each role separately, then call out the signals and let students act out roles together.
5. Congratulate students on being a great tree.



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6. Ask students to draw and label a tree with all of its parts.

Closure Discussion

Review all the parts of the tree and their functions.

References

7. B.C. Ministry of Forests. 1999. Forests in Focus. Pp. 24-29. ISBN 0-7726-3966-3
8. Burnie, David. 1998. Forest: An Extraordinary Look from the Inside Out. Pp. 12-15. Firefly Books. DK.
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10. Cornell, Joseph. 1989. Sharing the Joy of Nature. "Build a Tree". Dawn Publications.
11. Ganeri, Anita. 1992. Focus on Trees. Pp. 20-21. Gloucester Press.
12. Ganeri, Anita. 1993. What's Inside Plants? Pp. 16-21. Peter Bedrick Books. New York.
13. www.cpawscalgary.org/education/free-resources/lessons.html#5min [My life as a tree]

Extension of Lesson Plan

14. Do celery experiment with food colouring and look at cross-section of coloured xylem tissue under magnification. Explain that a celery stalk is like a tree trunk (without the wood) and contains xylem cells for sucking up water and nutrients from the ground.
15. Taste maple syrup and explain that students are actually tasting boiled up tree sap, made by maple leaves and carried in phloem tubes which maple syrup producers tap.

Parts of a Tree

Name _____

Draw and label the parts of a tree including roots, bark, trunk, crown, leaves. What is the function of each part?