

Maple Syrup & Forest Ecology

Pre and Post Activities

Pre-activity: Tree Factory

Materials: tree part cards and white board/chalk board

Vocabulary:

Photosynthesis: the process by which plants make food.

Chlorophyll: the green pigment in plants that absorbs sunlight in photosynthesis.

Chloroplast: a plant cell that contains chlorophyll. Photosynthesis takes place in the chloroplast.

Prep:

Print off tree factory cards. Print enough so there is one card for each student.

Lesson:

Introduce or review photosynthesis by comparing the baking of cookies to the process of photosynthesis. Write photosynthesis on part of the board and cookies on the other part of the board. Start by asking the students where in the house are cookies made? The kitchen. Write this under cookies. Where does photosynthesis occur in the plant? The leaves. Write this under photosynthesis. Certain ingredients are needed to make cookies and for photosynthesis. What ingredients are needed to make cookies? List the cookie ingredients under cookies. What are the “ingredients” for photosynthesis? Carbon dioxide, water and chlorophyll. If they mention other things like minerals or soil, write it on the top or side of the white board. Explain these are important ingredients for a healthy plant, but they are not directly needed for photosynthesis. If they say sunlight, tell them that is coming soon. Where do the cookies bake? The oven. This is where the ingredients change from being a bunch of stuff mixed together, to cookies. The chloroplasts, which are found mainly in the leaves, are like the plant’s oven. Photosynthesis happens inside the chloroplast and the ingredients are turned into a sugar (food for the plant). What powers the oven to bake the cookies? Gas or electricity. What heats the chloroplast or powers photosynthesis? Sunlight.

Once the dough is done baking, you have the final product. Cookies! In photosynthesis, once the process takes place, the end result is food for the plant. There is something else that is leftover that is very important. Does anyone know what else is created during photosynthesis? Oxygen. There is something else that is created when we bake cookies too. We don’t get to eat it, but it makes us hungry and makes us want to eat the cookies. The smell! It is a byproduct of making the cookies, just like oxygen is a byproduct (something extra) of photosynthesis.

Write on the white board:

	Cookies	Photosynthesis
Where:	Kitchen	Leaves
Ingredients	Flour, sugar, eggs, chocolate chips, vanilla, baking soda, etc.	Water, carbon dioxide, chlorophyll
Where ingredients change	Oven	Chloroplast
Power source	Electricity or gas	Sunlight
End Product	Cookies	Food for the plant in the form of sugar
By product	Delicious smell	Oxygen

Explain that from the roots to the top of the tree, each part plays an important role in keeping the tree healthy and alive. A tree needs more than just leaves! There are a lot of parts that we don't see. Hand each student a tree card and explain they are going to be acting out the different parts of a tree. The card they are given is their role in the play.

Call the **heartwood** (can have 2 students standing back-to-back) up first. Explain that the heartwood forms the central core of the tree and it is made up of dense, dead wood. It provides strength for the tree. Have the student(s) stand in the middle, flex their muscles and chant, "I support, I support!"

Next to the heartwood is the part that transports water through the tree. It is called the **sapwood**. Have 1 or 2 students stand next to the heartwood and chant, "Gurgle, slurp! Gurgle, slurp!" and "transport water", by reaching down by the roots for water and standing up holding their hands above their head (to show bringing water up to the leaves).

Ask the students where the water in the sapwood comes from? The roots. Have the **taproot** sit with his/her back against the sapwood and the **lateral root** lay down on the ground with his/her feet touching the taproot and their fingers and arms splayed out on the ground. They both make slurping sounds to demonstrate sucking up water.

Where does the water in the sapwood travel? It travels to the **leaves** (can have several students be leaves). Ask the leaves if they know why they need water? They need it to make food through the process of photosynthesis. Have the leaves flutter their hands and skip around the outside of the tree while chanting, "We make food! We make food!"

What do they think happens to all the food the leaves make using sunlight, carbon dioxide and water? It gets transported to the rest of the tree in the **phloem** (2 students). Students should reach above their heads toward the leaves and grab the food, then reach down and open their hands to release the food to the rest of the tree. They should chant, "Food to the tree! Food to the tree!" The sugar is made into other substances in the branches, trunk and roots.

There is another important part of a tree and that is the **cambium** (1-3 students) layer. The cambium produces new sapwood and phloem to keep the tree growing and keep it healthy. This is the part of the tree responsible for making tree rings. Have the cambium student(s) stand between the phloem and the sapwood chanting, "New phloem, new sapwood, new cambium!"

Ask the students what part of the tree is missing? The **bark**. Several students can be bark. The bark protects the tree from losing too much water and from many (not all) insects. Have the bark student(s) make a circle around the tree. They should face the outside, look fierce and chant "We are bark, please keep out!"

When the tree is completed, have the students act their parts at once. Let them go for a couple of seconds explaining when you clap your hands they all need to stop. Tell them this is what is going on inside of the tree during spring and summer. What happens in fall to some of the trees? They lose their leaves and these trees are called deciduous trees. The trees keep their foliage all winter are called evergreens. What kind of tree is a maple tree? In the fall, the leaves fall off the maple. This makes it a deciduous tree. Thankfully the leaves were working so hard during the growing season that extra food was stored in the tree before the leaves fell off. Some of this food is stored in the sapwood and some is stored in the roots. Then in spring, the tree uses that stored food (sugar) to grow its new leaves and start making food again. It is this sugar and the process of photosynthesis that we get maple syrup from.

Tree Factory Cards

Heartwood – Flex your muscles and say, “I support! I support!”	Heartwood – Flex your muscles and say, “I support! I support!”
Sapwood –Pretend to grab water from below and bring it overhead and say, “Gurgle, slurp! Gurgle, slurp!”	Sapwood –Pretend to grab water from below and bring it overhead and say, “Gurgle, slurp! Gurgle, slurp!”
Taproot –make slurping sounds and sit with your back against the sapwood and legs outstretched.	Lateral Root– make slurping sounds and lay on ground with feet touching taproot and arms splayed out.
Leaves –Flutter your hands and skip around the outside and say, “We make food! We make food!”	Leaves –Flutter your hands and skip around the outside and say, “We make food! We make food!”
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Phloem- pretend to grab food from leaves above and send it down and say, “Food to the tree! Food to the tree!”	Phloem- pretend to grab food from leaves above and send it down and say, “Food to the tree! Food to the tree!”
Cambium- chant, “new phloem, new sapwood, new cambium!”	Cambium- chant, “new phloem, new sapwood, new cambium!”
Bark: Stand tall with your arms crossed and say, “We are bark, please keep out!”	Bark: Stand tall with your arms crossed and say, “We are bark, please keep out!”

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Post-activity: A Day in the Woods

Read *One Day in the Woods* to your students by George, Jean Craighead. (1988)

Rebecca is out exploring the woods searching for an oven bird that her uncle challenged her to find. Throughout her wanderings in the woods, Rebecca meets up with many animals and plants whose natural history and relationships are described in detail. Jean Craighead George has made the woods come alive for readers through the travels of this young girl.

When finished with the story, have your students write a story about *their* day in the woods at Woodland Dunes Nature Center.

Another good book to read after the field trip is *A Tree in the Forest* by Jan Thornhill. (1991)

A maple seed lands in a decaying tree lying on the forest floor. The seed spouts and grows from a seedling to a mature maple tree enduring drought, fire, tapping for sap, a lightning strike and a multitude of animals living in it. After 200 years of life, the tree finally falls and begins to decay, becoming new soil for a young maple seed. The colorful, detailed illustrations invite the reader to look for more than is written in the text.

This story highlights the life and death of a maple tree. Have your students write a story from the perspective of a maple tree. What do they think about the birds and other animals using them for nests and food? What do they think of the squirrels running and chattering along their branches or humans tapping them for sap? How do they feel in spring, summer, winter or during storms and peaceful days in the woods? Explore the world of creative writing with your students!