

Once There Was A Tree

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Program Description: Trees serve many roles. They provide oxygen, homes, food, shelter, and shade for people and animals. They also store and recycle water, and help to hold the soil in place. In this show focusing on the importance and beauty of trees, we join LeVar in a forest, visit with a scientist who studies trees, and learn about how sugar is made from LeVar's favorite tree, the sugar maple.

Oxygen Production

Key Words: trees, plants, gas, air, oxygen, photosynthesis, observations

Concept: Green plants give off oxygen.

The tree in **Once There Was A Tree** provided food and shelter for many animals. All green plants including trees provide something else important to animals—the oxygen animals breathe. Almost all the free oxygen in the atmosphere is given off by plants. Green plants use energy from the sun to chemically combine carbon dioxide and water to produce glucose and oxygen. Plants use the glucose for food and release the oxygen into the air. This process is called photosynthesis. In this experiment, you can actually see tiny oxygen bubbles created by a plant.

Materials: Clear 2-liter soda bottle with a cap, scissors, a water plant from an aquarium store such as water milfoil or elodea, baking soda, teaspoon, water, a large bucket, bright sunlight or a lamp.

1. Fill a bucket about 3/4 full of water. Add one teaspoon of baking soda for each liter of water in the bucket. The baking soda (bicarbonate of soda) is used as a source of carbon dioxide to speed up the plant's oxygen production.
2. Cut the top half off a 2-liter soda bottle. With the lid off, submerge the top half of the bottle in the bucket of water so that the open top is up. After all the air has escaped from the bottle, place the cap on it.
3. Hold the plant underwater in the bucket and make a fresh cut on the end of the stem. While still underwater, gently shake the plant to release any trapped air bubbles. Then place it in the submerged soda bottle, upside down so the cut end is pointing up and is a few inches from the lid.

4. Look closely at the top of the bottle to be sure there is no air left in the bottle. If there is, remove the bottle cap and replace it again after releasing the air. Then leave the bucket in bright sunlight for several hours. After awhile, tiny bubbles of oxygen will rise from the cut end of the stem.



5. Again look closely at the top of the bottle. The gas that is trapped under the lid is oxygen that the plant released and has accumulated in the bottle. It may be easier to see how much there is if you tilt the bottle to the side so the bubbles move over to the curved part of the bottle.

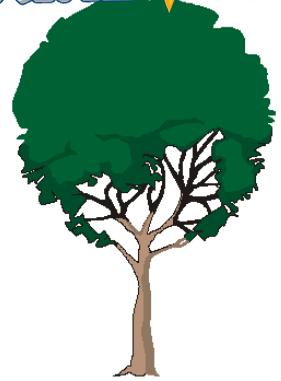
A Place In The Sun

Key Words: trees, leaves, area, photosynthesis, leaf mosaic, estimation of large numbers



Concept: The green leaves of plants collect sunlight and use it for photosynthesis.

For almost all trees, the important tasks of sunlight collection and photosynthesis only take place in the green leaves. Although individual leaves may seem small, if you start to add them up you will find that in addition to performing some colossal tasks, their collective size is enormous.



Materials: A broadleaf tree with green leaves, centimeter grid paper, colored pencils.

1. Ask a small group of students to collect a leaf from a nearby tree. Ask them to look for a leaf that is about the same size as most of the leaves on the tree. Then have them look up at the branches of the tree and notice that the branches are arranged in a staggered pattern around the trunk so that the leaves from one branch don't completely shade the leaves on the branch below. The pattern of branches and leaves on a tree is called the leaf mosaic. A branching and staggered leaf mosaic helps a tree by getting more leaves in sunlight, allowing the tree to make more food.
2. Ask the students to lay their leaf down flat on centimeter grid paper and trace around it.
3. Using a colored pencil, have the students shade in all the complete squares in their leaf shape. Ask them to count and record the number of complete squares.
4. Have students look for pairs or groups of remaining incomplete squares, that if combined, would add up to about the same area as a complete square (i.e. two half-squares). As they match up the incomplete squares, ask students to shade them in, and to count and record the number of complete squares made from combining the incomplete squares.
5. Ask the students to add up the total number of squares. This is the approximate area of their leaf—the approximate area for solar collection and photosynthesis production.

Extension: Have students compare the areas of leaves from different trees. Remind students that pine needles are also leaves. Ask them to speculate how evergreen trees make up for having such small leaves. (They have many of them.)

Follow-up Activity

Materials: A broadleaf tree with green leaves, pencils, grid paper, scissors, newspaper, a large open area.



1. Using the same tree as in the previous activity, ask students to try to guess the total photosynthesis production area for the tree (the total surface area of all the leaves on the tree). Would all the leaves on the tree cover a desk, a classroom, a gym, a football field?
2. Have students examine a large, low-hanging branch on the tree and count the number of leaves on a small part of the branch. Then ask them to estimate the number of leaves on the whole branch and write the number down.
3. Ask students to stand back from the tree and count or estimate the number of large branches. Have them (or help them to) multiply the number of branches times the number of leaves on the low-hanging branch. This will give them the approximate number of leaves on the tree.
4. Ask students to cut out several rectangles of grid paper that have as many squares as their leaf did in the previous activity. Then have the students lay these out on a sheet of newspaper to find out how many leaves would cover approximately the same area as a large sheet of newspaper. Help students divide the number of leaves on their tree by the number of leaves that fit on a sheet of newspaper. This number is the total number of sheets of newspaper equal to the area covered by leaves on their tree.
5. In a large open area, have students lay out the total number of sheets of newspaper equal to the area covered by leaves on their tree.

A Room With A View



Key Words: tree, making a model, tree house, trial and error problem solving, cooperation

Concept: Careful planning improves the final product.

There is something very appealing about a tree house; they are secluded, have good circulation of air, and best of all, they have a great view. Still, they can be very difficult to build. A good tree house must be safe and should not harm the tree in which it is built. The tree house used by scientist Meg Lowman was made after some very thoughtful planning. How would you make a tree house that was safe for you and for the tree?

Materials: Paper, pencils, small tree branches, buckets filled with gravel or sand, arts and craft supplies such as ice-cream sticks, pipe cleaners, string, and glue.

1. Ask pairs or small groups of students to select a small fallen branch for use as a model for a tree. Ask them to try to find one with several smaller branches on it so it looks a bit like a tree. Have students stand their branch up in a bucket filled with gravel and pretend that this is the tree in which they want to build a tree house.
2. Looking at their "tree," ask students to decide where in the tree they would build a tree house. Then have them make a drawing showing the shape and size of their tree house and its position in the tree. Ask them to plan ways to make their tree house safe. How will they make it sturdy, yet not too heavy for the branches? How will they make it open so the wind will not blow it down, yet not so open that you may fall out? How can they attach it to the tree without damaging the tree and leaving it open to infection? And of course they will need to plan a way to safely get up into and out of their tree house, even if the weather turns bad while they are in it.
3. After completing their drawing, have them collect materials and begin construction on the model. They may find that they have to alter their drawing to make use of available materials or to overcome a design flaw. Don't let that slow them down. Part of making a model is overcoming obstacles.
4. Have students share their drawing and model tree house with a classmate. Students should explain the safety features of their tree house and give examples of how it was constructed to coexist with the tree. Ask students to tell how they might change their design if they had the chance to really make the tree house.

That Special Something

Key Words: trees, bark, senses, touch, using observations, cooperation

Concept: Every tree is unique.

Trees can be thought of as pretty much all having certain parts. They all have a trunk, branches, leaves of some kind, roots, bark, and so on. When LeVar talked about his favorite tree, the sugar maple, he was referring to a specific kind or species of tree. Trees that are the same kind have parts that are the same in some way. The leaves are usually the easiest way to identify what species a tree is. Yet, even among trees of the same species, every individual tree is different. This can be seen as well as felt!

Materials: Blindfolds (1 for each team of 2-3 students), area with several trees that can be approached easily without damaging plants below them (e.g. not with flowers planted all around)-check to make sure that there are not harmful plants nearby trees (e.g. poison ivy, green cat briar).

1. Teach the students how to safely lead a person who is wearing a blindfold. The person being led can grasp the leader's left elbow with her or his right hand (or vice versa). The leader still has both hands free but the person being led can be close and feel the leader's movements. Also, talk to the students about watching for hazards such as low branches, things to step over, and so on. Be sure to emphasize that the leader must be trustworthy and responsible.
2. Review with the students the procedures for being safe outdoors (see **The Salamander Room** activity **Right At Home**.) Point out any trees that are off limits due to having hazardous or delicate plants around them.
3. Have one member of each team of students wear a blindfold. The other member(s) choose a tree in the assigned area. The blindfolded person can be led to this tree along a circuitous route, and maybe even with a little spinning here and there, so they do not know for certain where the tree is.
4. The blindfolded person can feel the tree from the base to as high as she or he can reach