

Summer Camps 2020

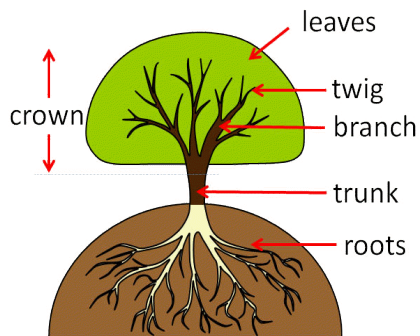
TREE CAMP

Kendall County Outdoor Education Center * www.kcoutdoored.org * dbazan@roe24.org

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Background Information

They are the oldest, heaviest and tallest things on Earth. They are all around us, big and small, changing throughout the year, and there are more than 50,000 different kinds on Earth. This camp will help you learn more about trees. You will learn about tree parts and how they work, you will learn about the life cycle of a tree, and you can find out services provided by trees.



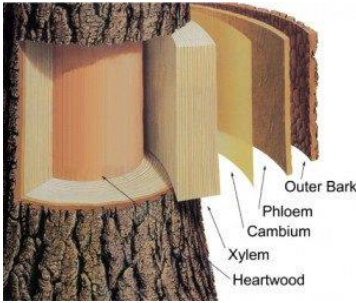
You may already know about the outside parts of trees. The **trunk** is the part covered in bark that you can wrap your arms around.

Underground are the **roots** that help hold the tree upright. These tree roots bring nutrients and water from the soil up into the tree so it can make its own food. At the top of the trunk we find the thick **branches**, and at the end of the branches are the thin **twigs**. From the twigs grow the **leaves**. Trees also make flowers which

eventually produce seeds. All of the branches, twigs and leaves make up the crown of the tree. Usually the crown of the tree is as large over your head as the root system is underground beneath your feet.

Activity #1: TREE RINGS

Materials: tree stump (or tree cookie), pencil, magnifying glass (optional)



Look at the diagram here. Trees have different layers inside, and each layer has a different job to do.

HEARTWOOD: This is the center of the tree and it provides strength for standing tall.

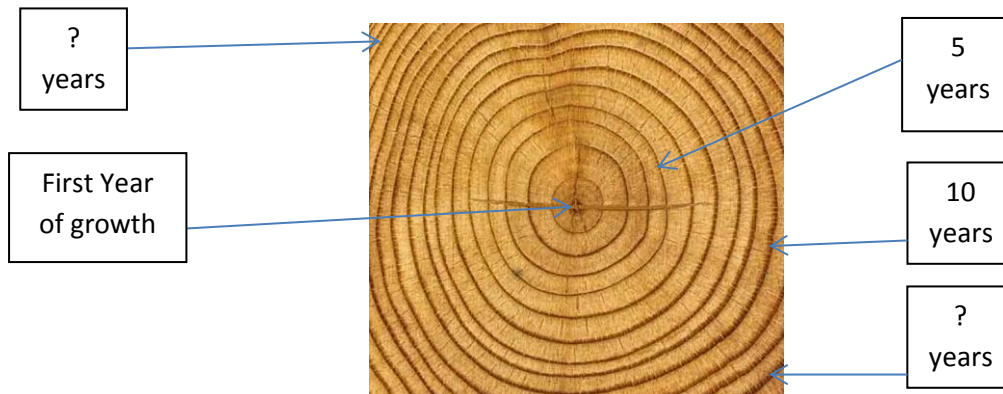
XYLEM (ZY-lum): This part carries water and dissolved nutrients upward from the roots. This layer is also called the sapwood (it carries the sap).

CAMBIUM (KAM-bee-um): This is a very thin layer of cells that divide. Some cells become the phloem, and some become the xylem.

PHLOEM (FLOW-um): This layer carries the sugar made in the leaves to the rest of the tree including the roots.

OUTER BARK: This is like the skin of the tree; it protects the tree from being scorched by the sun or dried out by wind. It also helps protect the tree from disease, insects, and storm damage. The bark keeps the living layers safe from damage.

Each year a tree gets thicker around as they layers continue to grow and push the bark outward. The bigger around the tree gets, the older the tree is. You can figure out the age of your tree by counting the rings. How old do you think this tree sample is?



While you are out for a walk, find a tree stump from a tree that has been cut down. Can you count the rings? Use a pencil to keep track of the rings you have counted. When the rings are far apart, it means it was a good year for growing; there may have been plenty of sunshine and water. If the rings are close together, it was a poor year for growth. A section of a tree trunk or branch is called a tree cookie (available at the KCOEC). Explore this resource for more explanation.

<http://www.internationalpaper.com/docs/default-source/english/sustainability/treerings.pdf?sfvrsn=2>

Activity #2: HOW BIG IS THAT TREE?

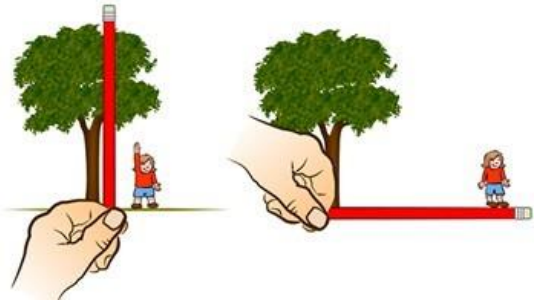
Materials: scratch paper, pencil, a measuring tape, small stick, trees to measure

Take a walk through your neighborhood and look closely at the trees, and you will notice a variety of sizes, shapes, colors and textures. Arborists (people who work with trees) and foresters need to be very good at measuring trees, and today you can do that, too.

Find a tree that you want to measure and follow these steps.

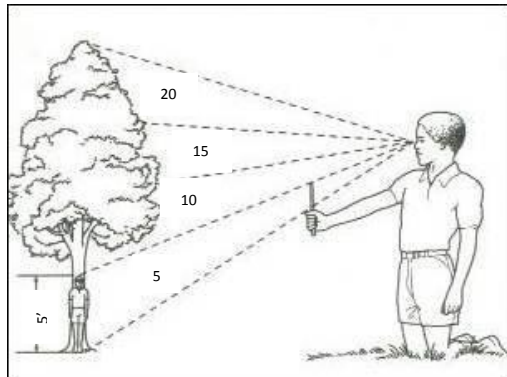
1. **Circumference and Diameter:** Starting at the ground, measure up the tree trunk 4 ½ feet (1.4 m). This point of the tree trunk is called the DBH (diameter at breast height) and is the standard point for measuring tree diameter. Now measure to the nearest inch the circumference of the tree at DBH (the distance all the way around the tree). To calculate the diameter of the tree (how far across the middle), use this formula: $d = C/\pi$. For example, if your circumference is 12 inches, then diameter = $12/3.14$, so diameter = 3.82 inches.
2. **Height:** The height of a tree is measured from the ground to its top twig and is approximated to the nearest foot. Here are two methods for measuring tree height.

- a. Stand about 15 paces back from the tree while your partner stands at the base of the tree. Hold a pencil at straight arm length in front of you, and back up until the bottom of the pencil is even with the bottom of the tree and the tip of the pencil is even with the top of the tree. (Sometimes it helps to close one eye.)



Now lay the pencil on its side while keeping the bottom of the pencil at the base of the tree. Have your partner stand at the end of the pencil on the ground. This is the height of the tree if it were to fall over. That distance is the height of the tree.

- b. Stand about 15 paces back from the tree. Your partner will stand at the base of the tree. Hold a pencil at straight arm length in front of you, and back up until the pencil is the same size as your partner. (Sometimes it helps to close one eye.) Visually move your pencil up the tree trunk from bottom to top, counting the number of times you move. Multiply that number times the height of your partner and you will have the height of the tree. For example, in the illustration, the boy at the tree is 5 feet tall. The boy measuring moved his pencil up 4 times. $5 \times 4 = 20$, so we can estimate that the tree is 20 feet tall.



- c. If you like mathematic calculations, then try this method on a sunny day. Push a stick into the ground deep enough to hold it upright. Measure the length of the stick out of the ground. Then measure the length of the shadow of the stick, and the length of the shadow of the tree. Using the ratio formula below, calculate the height of the tree.

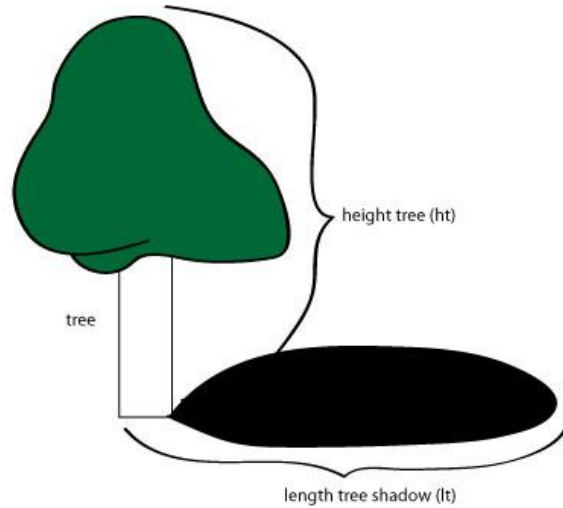
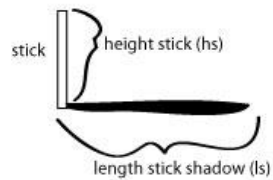
For example, if the stick is 6 inches above ground, the shadow of the stick is 10 inches, and the shadow of the tree is 360 inches, then your formula looks like this: $\frac{6''}{10''} = \frac{x}{360''}$

$$10x = 2160 \quad x = 216 \text{ inches (18 feet tall)}$$

10'' 360''

$$hs/ls = ht/lt$$

$$ht = (hs/ls) lt$$

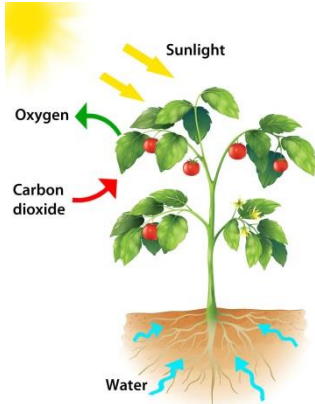


Practice measuring trees in your neighborhood. Which one is the tallest one? How tall is it? Does taller mean older? When you have practiced, come out to the KCOEC and practice with some trees in the forest. How do forest trees compare to trees in your yard and neighborhood?

Activity #3: LOOKING AT LEAVES

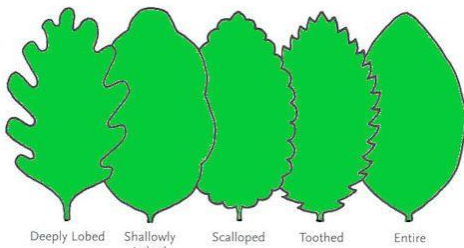
Materials: various leaves on trees

PHOTOSYNTHESIS: Leaves are very important to trees because they produce food through a process called photosynthesis (FO-toe-SIN-the-sis). PHOTO means “light” and SYNTHESIS means “putting together”, so the leaves put together carbon dioxide and water and use sunlight energy to produce sugar, which is food for the tree. The tree carries this sugar through its phloem to all parts of the tree, including the roots. Yes, trees make their own food!



In the fall, we lose hours of sunlight, and without enough sunlight energy, the tree cannot make food for itself. That is why the trees drop their leaves for the winter. In the spring, trees grow new leaves as the days get longer and there is more sunlight. When you study the trees, be sure not to pull the leaves off. You don’t want the tree to go hungry!

LEAF SHAPES: Leaves come in all kinds of shapes and sizes. Go for a walk in your neighborhood and look for leaves. If you can find them on the ground, then you can pick them up. Do not pull leaves off of trees.



SIMPLE LEAF	TOOTHED LEAF	SCALLOPED LEAF
PALMATE LEAF	LEAVES OF NEEDLES	ENTIRE LEAF
LOBED LEAF	PINNATE LEAF	COMPOUND LEAF

Mark off the leaves in this chart when you find them. Try not to use the same leaf twice.

Activity #4: LEAF RUBBINGS

Materials: peeled crayons, leaves, plain paper

Leaves all grow from a stem, and inside the leaves you find veins. These veins support the leaf, and they carry water, minerals and food between the leaf and the rest of the tree. To capture the shape and the veins of your leaf, try leaf rubbings. Follow these steps:

1. Lay the leaf upside down on a flat surface.
2. Place your paper carefully over the leaf.
3. Hold both the leaf and the paper in place and rub your crayon over the paper where the leaf is hiding. Your leaf will appear through the paper!
4. For more information, visit this tutorial: <https://www.firstpalette.com/craft/leaf-rubbings.html>

Activity #5: MEET A TREE

Materials: partner, blindfold, variety of trees to touch

In this game, you will need a partner. Find a place where there are several trees to touch. Blindfold your partner and spin him around gently 5 times. Now walk your partner to a tree (be sure to get him there safely). Your partner should touch the tree and feel the bark and branches and ground around the trunk. Now walk your partner safely back to where you started. Remove the blindfold and ask your partner to find the tree he just touched. Was he right? How did he know that was his tree? Now it's your turn to wear the blindfold!

Activity #6: WHAT GOOD IS A DEAD TREE?

Materials: dead trees (including one laying on the ground)

Trees have a life cycle just like people. They sprout from a seed, they grow, they produce flowers and seeds, and eventually they will die. We know that trees produce their own food while they are living. They absorb carbon dioxide and release oxygen and water. But what happens to them when they die? Watch this 4-minute podcast and list 5 things that dead trees provide.

<https://multimedia.illinois.gov/dnr/DeadTree.mp4>

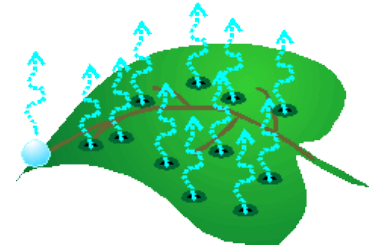
Find a dead tree that has fallen to the ground. Do you see the decomposers? Cross them off the list as you find them. Use a magnifying glass to look closely. If the tree has decomposed enough, you may be able to pull a chunk of wood from the tree and squeeze water from it. As the tree decomposes, it becomes soil from which new trees can grow. Nature recycles itself!

MUSHROOMS	CENTIPEDES	WORMS	MOSS
WATER	BEETLES	MITES	HOLES IN THE WOOD

Activity #7: LEAF TRANSPIRATION

Materials: leaves growing on trees (that you can reach), zip lock bag, duct tape

Every leaf on a tree produces food through a process called photosynthesis. When food is made, there are some leftover materials that the tree must release. Do you know what those are? One is what humans need to breathe... oxygen! The other is what humans need to drink...water! Water comes up through the tree from the roots, is used to make food, and then is released through tiny holes on the bottom side of the leaf called stomata. According to the USDA Forest Service, a healthy 100-foot-tall **tree** has about 200,000 leaves. A **tree** this size **can** take 11,000 gallons of **water** from the soil and **release** it **into the air** again, as oxygen and **water** vapor, **in** a single growing season. Here is an experiment allowing you to capture that water.



<https://www.youtube.com/watch?v=9clgg5fwn2o>


























1. Find some leaves on tree that you can reach, about 4-5 will work.
2. Carefully place the bag over the leaves until they are tucked inside. Zip up the bag.
3. To make the bag airtight, put a small piece of duct tape over the opening and zipper.
4. Watch the bag for the next 2-3 days. Can you explain what is happening?
5. If you are really curious, try this experiment with different kinds of trees/leaves. Do some trees produce more water than others?

You probably have lots of questions. How much water can a tree absorb in a day? How does water reach the top of the trees? What percentage of a tree is water? What kind of tree absorbs the most water? You will be amazed as you find the answers to these questions!

Activity #8: TREE PRODUCTS

This short video introduces the kinds of everyday items we use that come from trees. Watch it and then play the game. <https://www.youtube.com/watch?v=cRiTdt6NGBQ>

In the following chart, cross out the items that do NOT include tree products.

APPLE 	BASEBALL BAT 	BOTTLE CORK 	DETERGENT 	EASEL 
FURNITURE 	GUM 	HOCKEY STICK 	PAPER 	JELLY 
KEG 	LUMBER 	MATCHES 	NUTS 	OAR 
PERFUME 	CHOCOLATE 	RUBBER TIRES 	SHAMPOO 	TOOTHPASTE 
GUITAR 	VANILLA 	WAX 	XYLOPHONE 	YARDSTICK 

(Answer: All these items are made of tree products. None are crossed out.)

What would your life be like without all of these products?

- Wood:
 - Fuel
 - lumber for houses
 - Furniture
 - Plywood
- Cellulose (major component of wood):
 - Paper
 - Paper products
 - Carpeting
 - Suntan lotion
- Bark:
 - Cinnamon
- Sap:
 - Cosmetics
 - Soap
 - Sugar & Spice
 - Crayons
- Fruit, Leaves & Seed:
 - Fruits
 - Nuts

ADDITIONAL RESOURCES

<https://www.youtube.com/watch?v=abVvZLyZAlg> Adventures in Learning: Learning About Trees. PBS Parents (5:12)

<https://www.youtube.com/watch?v=0lDH7HDfVmM> How Trees Grow. US Forest Service and US Department of Agriculture. (2:53)

<https://www.youtube.com/watch?v=gEfhofqob7o> Science Trek: Tree Video. Idaho Public Television (4:26)

<http://www.internationalpaper.com/docs/default-source/english/sustainability/treerings.pdf?sfvrsn=2>
What can tree rings tell us about a tree's history?

<https://www2.illinois.gov/dnr/education/Pages/ILFallColors.aspx> Illinois Fall Tree Colors

<https://multimedia.illinois.gov/dnr/DeadTree.mp4> What Good is a Dead Tree?

<https://www.arboday.org/kids/> Interactive Tree games for kids