experience LEARNING
beyond the classroom

Name: _____
Date: _____

Intro to Trees

1. ACTIVITY - Meet a Tree — ENGAGE

You will need:
1. A partner (sibling, parent or guardian)
2. A blindfold
3. An area with as many trees as you can find

Directions:
1. Decide who will be blindfolded first. The other person will be the guide.
2. The guide will lead the blindfolded partner through the trees in an unrecognizable pattern. You want to disorient them but still be a compassionate and gentle leader. Remember it will be your turn next!
3. After successfully disorienting the blindfolded person, lead them to a single tree.
4. The blindfolded person then gets to know the tree as well as they can without looking it. Don't forget to hug it high and low, smell it, listen for birds, touch it, and anything else that might help you remember this tree. There is no time limit so spend a good amount of time finding identifying characteristics about this tree.
5. After the blindfolded participant feels they have spent enough time with the tree to remember it, lead them back to the starting point. Make sure you take them on a few detours on the way back, so they won't remember how they got to the tree.
7. Take off the blindfold and have them try to identify their tree.
8. Switch! Change positions so the initial guider is now the blindfolded person and repeat the activity.

ANSWER

1) How did the bark feel?

2) Why do you think trees have bark?

3) Leaves come in all different shapes and sizes, and can even be needles. Find a leaf or bunch of needles from the ground. Is it from your tree – how do you know?

4) Why do you think trees have leaves and/or needles?

5) Have you seen any signs to indicate how your tree reproduces (cones, flowers, fruit, seed pods, etc.)?

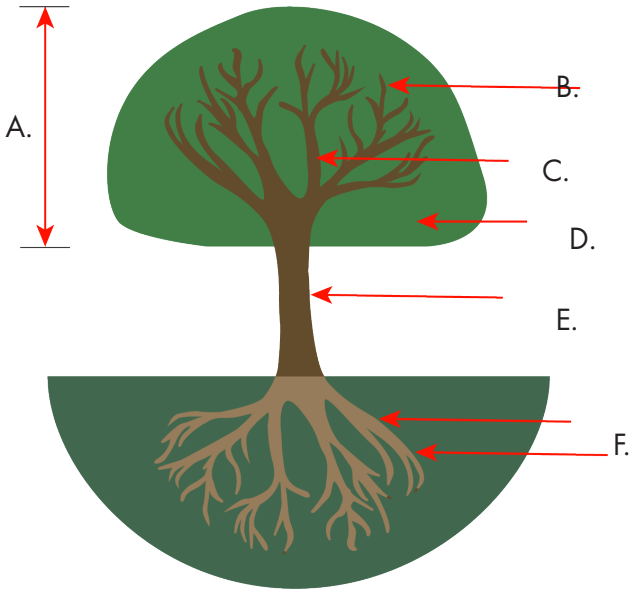
READ AND LABEL

Parts of a Tree

A tree's *roots* serve several important functions. They are the underground branches that work as an anchor to keep the tree in the ground and stable. They also absorb water and minerals from the soil. The same way you need water and nutrients to survive so do plants and trees. Think about a sponge sitting in a bowl of water and how much water the sponge sucks up from the bowl. Roots function in a similar fashion.

The water and minerals are then transported up the tree from the roots through the trunk kind of like travel on an interstate, with water and minerals travelling up from the roots and sugar (food) travelling down from the leaves. The *trunk* is the large woody middle section of the tree that is oftentimes the section most accessible to us ground dwellers. Financially speaking it is also the most valuable part of the tree for lumber.

The outermost layer of the trunk is called the bark and it protects the softer wood inside the tree from insects and disease. Off the trunk grow the *branches*, which support the *twigs* and *leaves*. New cells are produced at the tips of twigs, as the twig tips get longer the tree gets taller. The leaves play a crucial role in food production and the branches and twigs provide structure and support to the tree. The combination of the leaves, branches and twigs make up the top part of the tree which all together is called the *crown*.



Fill in the blanks with these parts of a tree:

trunk **twig** **branch**
leaves **crown** **roots**

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

2. How Do Scientists Measure Trees? EXPLORE

Think about all the different ways you could describe a tree -- how tall it is, how wide it is, how thick the trunk is, the shape of the leaves, the texture of the bark.

Some scientists focus on the size of the trunk. The standard measurement is called *diameter-at-breast-height, or DBH*. First they measure the *circumference* -- the distance around the tree's trunk -- at a specific height, then they use that measurement to find the *diameter* -- or distance from one side of the trunk to the other. Scientists can learn a lot about a tree and the ecosystem around it by taking this measurement and comparing it with other measurements and other trees.

This short video explains how to take a DBH measurement.

https://youtu.be/R9eQ9qFrSVs

Now let's gather some tools and go gather some data about the trees around you!

You will need:
1. Measuring tape or yardstick
2. Long piece of string
3. 1 push pin
4. Field journal or several pieces of paper
5. Pencil and a crayon
6. You may want a hard surface to write on

If you don't have string anything long and flexible like shoelaces, old ties, belts, wire can work too.

Go back to the spot where you got to know a tree in the first section of this lesson. Pick 5 trees.
Follow these steps for each tree.

1) Find your measuring spot:

Using your measuring tape or yard stick, measure 4 1/2 feet up from the ground on the trunk of the tree.
Investigate the tree's trunk at 4 1/2 feet:

Does it fork below this height?
If so only use the measurement of the largest trunk, not both.

Are there any large lumps or irregularities at this height?
If so, pick a spot a foot above or below the affected area, whichever area is no longer affected by the irregularity.

Is your tree comprised of a lot of small trunks coming out of the same root?
If so, you will have to measure the circumference of each small trunk then add each measurement together to get the sum or total circumference.

2) Take your measurement:

Put the push pin in the tree at this height (4.5 feet from the ground). Start your measurement from this point.
Wrap the long piece of string around the trunk of the tree at this height.
Make a mark on the string where it meets.

3) Convert the string to the appropriate unit of measurement.

Using a yardstick/measuring tape measure the length from the end of the string to the mark you made. If you don't have these tools you can pick a unit of measurement specific to you like foot lengths or arm spans. Write this number in the chart for circumference. Make sure you write down the units you used.

4) Make a leaf rubbing.

Find an intact leaf (or bunch of needles) from your tree. Place them on a hard surface with paper on top of the leaf Rub the side of a crayon gently over the paper to create a rubbing. Record any observations on your chart.

5) Make observations.

Take a few moments to make observations about your tree. What stands out to you about the tree? Is it straighter, taller, scrubbier? Does it have lots of leaves or just a few? Describe the color of the leaves and the texture of the bark, or any notable features on the trunk or roots or limbs.

4) Gather a branch.

Gather a small branch to use later in this lesson. Try to find the end of a branch that has several side branches coming off of it on either side. Try to remember which tree each branch comes from.

	Tree 1	Tree 2	Tree 3	Tree 4	Tree 5
Circumference *(in inches or centimeters or unit of your choice)*					
DBH *(circumference divided by 3.14)*					
Observations *(record anything interesting about your tree here.)*					
Evergreen or Deciduous? *(use the dichotomous key)*					
Alternate or Opposing Branches?					

3. Evergreen or Deciduous? EXPLAIN

An *evergreen* is a tree that holds on to it's leaves year-round while a *deciduous* tree loses all it's leaves for part of the year. We think of most trees with needles, like pine trees, as evergreens but it is not that simple. Some trees with needles actually lose their needles for part of the year while some trees with leaves are evergreens!

Watch this video to learn about evergreen and *conifer* trees, then we are going to do an activity to figure out which of the trees you just measured are evergreen and which are deciduous.

https://youtu.be/hwfQEK29Wrg

Of the 5 trees you found can you tell if they are deciduous or evergreen? Use the dichotomous key on the next page to help guide you to the answer. You may need to look at any leaves you gathered or rubbed and observations you made about each tree. Record your answers on the chart.

Dichotomous Key: What Type of Tree Did I Find?		
1	Does it have leaves?	Go to #2
	Does it have needles?	Go to #3
2	It has flowers, fruits, or seeds.	Go to #4
	It has cones.	Go to #5
3	It has cones.	Go to #6
	It has flowers.	Go to #7
4	It is a deciduous tree.	Examples: Oak, Maple, Sycamore, Beech, Birch, Walnut, Locust, Poplar, Apple
5	It is a deciduous conifer (rare).	Examples: European Larch, Tamarack Larch, Bald Cypress, Dawn Redwood
6	It is a conifer.	Examples: Pine, Spruce, Fir, Juniper, Hemlock, Cedar
7	It is a flowering evergreen (broadleaf evergreen).	Examples: Rhododendron, Mountain Laurel, Holly, Azalea

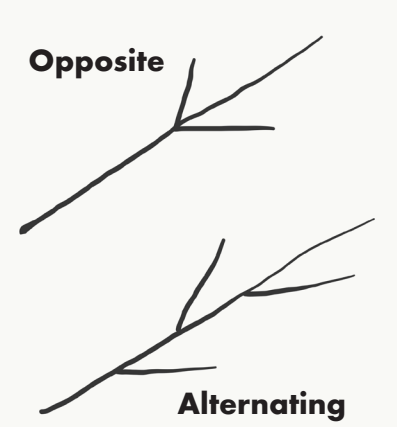
4. Alternating or Opposing Branches EXTEND

By this point you have observed a lot of different aspects of a sample of the trees around you. Maybe you have a guess about what kinds of trees you are working with and maybe not.

Now we are going to use that twig you gathered to observe one more thing about your trees: Branching Structure.

Branching structure is a useful feature to understand because we can use it as an identifying feature the whole year -- even if the tree doesn't have leaves or flowers or fruits on it at that time. And it is pretty simple!

Alternate branching trees have branches that come ouf of the stem on first one side then the other, taking turns. Opposite branching trees have branches that emerge at the same spot on a branch.



This simple difference is helpful because only a handful of deciduous trees have opposite branching structure. So if you have a branch opposite branching structure in your hand you're holding a branch from a type of maple, ash, dogwood, or buckeye.

Using the branch structure and a few other identifying characteristics like bark and tree shape we can identify most trees any time of the year. In West Virginia, maple trees are the most common tree with an opposite branching structure. So if you find a handful of them near your house, you might be about to start making a little maple syrup from your backyard next winter!

Take a look at the branches that you collected from your five sample trees. Try to identify them as Opposite or Alternating and add that information to complete your chart!

Now that you have learned so much about your 5 trees, take your observation chart and try to identify the species using an online tree app like the Arbor Day Foundation's *What Tree is That?*. Write your guess at the top of each column next to the tree number.

What tree species do you think you found? Can you describe any unique characteristics that led you to your answer?

5. Reflect EVALUATE

How did it feel to trust someone else when you were blindfolded? Were you fearful, excited or anxious? Did you feel well supported?

Trees are only as strong and as stable as their root system. Think about the root system in your life, what supports you? Get creative – draw, sculpt, film, photograph, paint, write, or use whatever you can think of to illustrate some of the things in your life that help you to feel rooted, grounded and secure.

6. Extras

VOCABULARY:
Circumference: the distance around a circle.
Diameter: a straight line passing from side to side through the center of a body or figure, especially a circle or sphere (in our case a tree).
Deciduous: A tree or shrub that loses it leaves each year.
Conifer: A cone-bearing tree or shrub with needles.
Evergreen: A plant that retains its leaves year round.

Interactive Dichotomous Key:
https://www.eekwi.org/explore/identification/dichotomous-tree-key

Optional Step - Calculate the Diameter at Breast Height:

You found the circumference but foresters use the DBH or *diameter at breast height* measurement. In order to find the DBH we must convert the circumference to diameter.

It's easier than you think. Just take your circumference and divide by 3.14 (which is the number π *or* pi), now you have the tree's diameter.

Example:

Diameter = Circumference/3.14

If Circumference = 8 feet

First convert feet to inches:

8 feet x 12 = 96 inches

Then calculate diameter in inches:

96 inches /3.14 = 30.5 inch diameter