



Time Needed

2 to 3 days

Materials needed for each group of two to four students:

- A copy of the sample tree-ring cores on page 47.
- One 1-meter strip of adding machine tape or thick ribbon.
- Colored pencils and markers.
- Reference material, such as almanacs, that provide students with the dates of social, cultural, environmental, and scientific events over the past five decades.
- A notebook for recording results (optional).
- Tape and scissors.

The question you will answer in this FACTivity is: How does dendrochronology help us understand the environment in which a tree lives?

Day 1:

In this FACTivity, tree-ring core samples showing the tree-ring patterns of four trees are represented by four strips on page 47. You can imagine what real cores look like if you take a straw and draw one of the patterns on the straw. These cores are taken from a tree using an instrument borer. An instrument borer is a hand drill that pulls out a thin cylinder of wood from the trunk of a tree. The borer must go all the way to the center of the trunk to accurately read the tree-ring patterns. After the core sample is pulled, scientists seal the hole so the tree is protected from insects and disease.

Using the four core samples on page 47, each group will construct the climatic (*klī ma tik*) history of the trees. You will then record social, cultural, environmental, and scientific events that occurred during the lifetime of these four trees.

Process:

1. Read the background information provided at the end of this FACTivity.
2. Make sure your group of students has a copy of the four tree core samples printed on page 47.
3. Imagine that you have tree core samples from:

Sample 1: A living tree that was cored this year in Oakwood Forest.

Sample 2: A log found near the main trail in Oakwood Forest. The log was cored four years after it fell.

Sample 3: A tree that was cored 1 year before it was cut down in Oakwood Forest.

Sample 4: A barn beam from Oakwood Hollow Farm. The beam was cored this year.

4. Cut the tree core samples into four strips.
5. The left side of each tree core sample represents the first year of growth of the tree. The right side represents the bark and, just to its left, the year the tree core sample was pulled. The tree rings are represented by the rectangles making up each strip.
6. Each year of growth is represented by a larger light-colored "ring" and a smaller dark-colored "ring." The larger light-colored ring represents fast spring growth and the smaller dark-colored ring represents slower summer (and sometimes autumn) growth. Beginning with Samples 1 and 2, match the tree ring patterns and tape the two strips together. Continue this by adding Samples 3 and 4. Sample 1 represents the youngest tree and Sample 4 represents the oldest tree that was sampled.

Now, on the strips,

7. Write the current year in space provided.
8. Counting backwards from the current year, identify the years each tree was cored. To keep track, write any year where you find room on the strip.
9. Identify the year Sample 4 tree began to grow and write it in the space provided.
10. Complete the following chart:

	Age of tree	Year tree was cored	Year growth began
Sample 1			
Sample 2			
Sample 3			
Sample 4			

11. Look for patterns in the rings. Answer the following questions:
 - a. In what years was there low rainfall or other unfavorable growing conditions?
 - b. What 2 years were the most favorable for tree growth? What might have happened in those years to support tree growth?
 - c. What overall patterns do you notice in the year-to-year weather patterns?

Day 2:

12. Make a timeline. Spread out the adding machine tape. Beginning at the left end of the tape, record each year from the earliest year identified on the tree-ring samples through the current year. After the years are recorded on the strip, identify years that were good growing years for the trees in Oakwood, and years that were poor growing years. Think of other events that might have happened during this time period such as birthdays, Presidential elections, important scientific discoveries, environmental events, cultural or social events, and record-setting sports achievements. Fill them in on the timeline. Color the timeline and illustrate it with drawings, photographs, or newspaper clippings.
13. Here are some follow-up questions.
 - Which ring on which trees represents your birth year?
 - What kind of growing season existed that year in Oakwood?
 - What buildings in your area were built during the lifetime of these trees?

Optional:

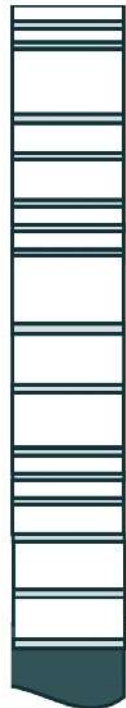
Before doing this FACTivity, the teacher may simulate tree core samples using straws. The "tree rings" may be drawn on the straws, based on the "core strips." If straws are used in place of the strips, each group of students should be given a set of four straws.



Write current year here: _____

Sample 1: Cored this year

Cut here ⇨



Bark

Sample 2

Cut here ⇨



Year Sample 2
tree was cored:

Sample 3

Cut here ⇨



Year Sample 3
tree was cored:

Sample 4

Year Sample 4 tree
began to grow: _____



Year Sample 4
tree was cored:



Background

Dendrochronology is the study of tree rings to learn about climatic and environmental changes in an area surrounding a tree. Each year's tree-ring width is unique. They are like a barcode. From these rings, scientists can work backward from the present to determine climate conditions where the tree lived. Using this technique, scientists can date trees that have been dead for centuries. The tree rings help tell a story about climate because the width of the tree ring indicates something about the climate. For example, narrower rings indicate poor growing conditions and wider rings indicate more favorable growing conditions.

Reading Tree Rings

Tree rings are formed from the center of the tree outward. The ring closest to the bark is the youngest and final growth ring. The ring closest to the center of the tree is the oldest and first growth ring. Neither the outer layer of bark nor the central pith layer of a sample is counted when determining the age of a sample.

Similar ring patterns are found between trees growing under the same conditions. The most obvious feature of these patterns is varying widths. Widening of a ring indicates good growing conditions, and narrowing indicates poor conditions. Conditions can include climatic factors such as temperature and moisture and factors such as erosion, insects, fire, landslides, etc.

This FACTivity is adapted and reproduced with permission from U.S. Geological Survey (USGS). The activity can be found in USGS's Global Change Teacher Packets. This activity and others can be found at <http://egsc.usgs.gov/isb/pubs/teachers-packets/globalchange/globalhtml/time.html>

Note: For more in-depth background information and a teacher's guide, please visit the Web site listed above. This Web site is linked from the *Natural Inquirer* Web site at <http://www.naturalinquirer.org>.

Extension



Find and map the locations of some of the oldest known trees in your neighborhood. Sketch what you think a core from one of these trees might look like. To help you, research the weather history of your area.

Contact your local forestry service or science museum and obtain some actual cross-sections of trees that have been cut in your area. Use the techniques applied during this activity to "read the tree." If a tree has been cut in your neighborhood recently, look at the tree rings on the stump or ask if you can keep a small piece of the trunk.

Create some simulated core straws of your own for another group to analyze and report about.