

Dendrochronology

Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topics: Tree Rings, Tree Cores, Life Cycle, Seasons, Environmental Conditions

Summary: Students will measure growth rings in tree cores, cross sections or stumps and examine the relationship of these rings to environmental conditions.

After completing the field lab, students will be able to:

Objective(s):

1. Use selected equipment to extract and study tree cores and rings
2. Relate tree growth to environmental conditions over time
3. Measure tree rings using the core

Ecosystem(s): Hammocks; Pinelands; Scrub, Upland

Equipment:

- Tree Cookie
- DBH tape
- Rulers
- Magnifying lenses
- Prepared cores in mounts
- Tree corer
- GPS Receiver

Background (Pre-field Classroom Activity)

1. **Vocabulary:** diameter, radius, circumference, stressors, tree ring, average, core, growth rate
2. **Reference Material:** *Tree Cookies*, Review of metric measurement Review background information from Project Learning Tree activity on tree rings, “Investigate learning from tree rings”, pg 249-250 of Florida Lab Manual grade 7—teachers edition, chapter 13 on Views of Earth’s Past.
3. **Equipment Training:** Tree corer, GPS

Procedure (Engage; Explore; Explain)

1. Ask students to reflect on the change in their height as they grow. Then ask them to consider the growth in their waistline as they grow. Have them compare these changes with the changes that a tree goes through. Explain that trees add new wood every year and that this wood can usually be differentiated from wood added in previous years.
2. Explain that trees add new wood every year in the form of a growth ring. These rings include light and dark sections (light section represents the growing season and the dark section the rest of the year). Together these represent one year of growth.
3. In years where water and nutrients are abundant, growth rings are thick. In years, where water is limited or other stressors exist, growth rings are thin.
4. Examine a tree cookie/cross section. Place a tree corer on top of the cookie and demonstrate how it could collect the same information without having to cut down the tree.
5. Demonstrate how to use the DBH tape and tree corer. Give each student a chance to use both pieces of equipment.
6. The last step requires students to transfer the tree ring information from their sample core to the bottom of their data sheet. After folding the page under along the dotted line, students place the folded edge on top of the wide side of the wooden mount so that the paper is directly against the core. Using a pencil, students place tick marks along the fold corresponding to each of the dark rings on their core.
7. Complete the data sheet, and answer assessment questions

Sunshine State Standards

Science: SC.D.1.3.2, 4, 5; SC.F.1.3.1; SC.G.1.3.2, 4, 5; SC.G.2.3.3; SC.H.1.3.4; SC.H.2.3.1; **Language Arts:** LA.A.1.3.3; LA.B.2.3.1; LA.C.1.3.1; **Mathematics:** MA.A.1.3.1; MA.B.2.3.1; MA.B.3.3.1; **Social Studies:** SS.A.6.3.2; SS.B.2.3.9

Dendrochronology

Student Data Sheet

General Information

Full Name:		Date:	
School (teacher):		Time:	
Latitude:		Longitude:	

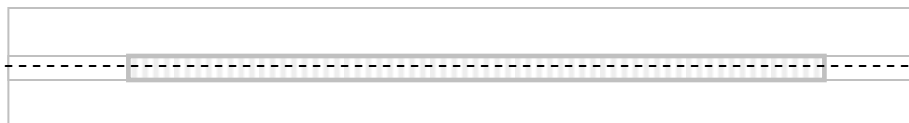
Student Hypothesis and Rationale

If rainfall affects tree growth than I hypothesize that a tree will have a (choose one: higher/ lower or same rate of growth during periods of increased rainfall because _____

Field Observations/Measurements/Data

Item	Measurement
Diameter at Breast Height (DBH) (cm) [at time core was taken]	
Date of Core (month/year) [written on side of mount]	
Length of Core (cm) [measure from center mark to just inside bark]	
Age of tree (years) [Count number of growth rings]	
“Birth Year” of Tree [Subtract age of tree from year core was taken]	
Average Growth Rate (cm/year) [Length of core divided by the number of rings] Show fraction then use calculator to convert to decimal	
Average Growth Rate during 1995-2005 (10 yr. period) [length from 1995 mark to 2005 mark divided by 10] Show fraction then use calculator to convert to decimal	
Average Growth Rate during 1985 – 1995 (10 yr. period) [Length from 1985 mark to 1995 mark divided by 10] Show fraction then use calculator to convert to decimal	
At the bottom of this page, transfer your core data to the edge of this data sheet. Be careful not to write on the core itself. Mark the following on the data sheet: Center- label “C”; ; Outer bark = label “B”; Each growth ring; Label the ring that corresponds to your birthday with the year; label the ring for 1985; label the ring for 1995.	

Fold paper on dotted line and transfer your tree core rings to the edge of the paper below



Fold this side backward

Dendrochronology

Assessment

Examine the rainfall data below and relate it to the growth rates you calculated for the two different time periods:

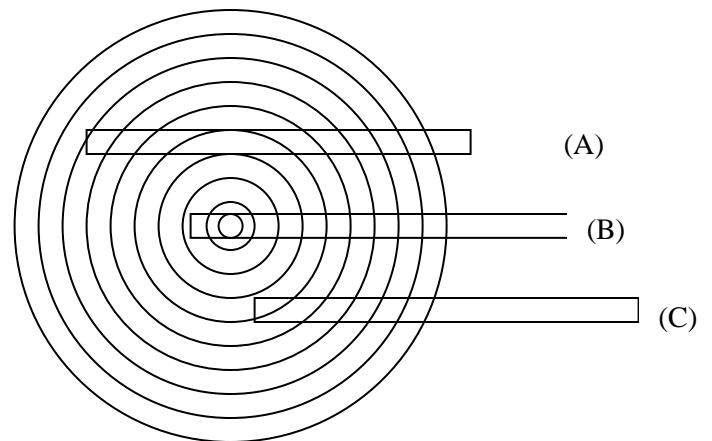
1985-1994: Average Rainfall = 60.4 inches/year
1995-2004: Average Rainfall = 53.2 inches/year

1. Explain how rainfall may have affected tree growth in the area?

2. What was the diameter of the tree the year you were born?

3. Under what conditions might two trees of the same type and age have different growth rates?

4. Which of the cores to the right (A, B, or C) would be the best to use if aging a tree? Why?



5. What do you think is the factor that effects plant growth in the park the most? Why?

Dendrochronology

Post Activity

Complete the concept map below by choosing from the following words or phrases:

- Competition (from other trees)
- Disease
- Tree rings

