

Biology

Tree Rings

Grade Level: 4-8

Classroom Time: 60 minutes

Materials:

Tree ring cookies
Tree ring information
The Stump
Be a Dendrochronologist
Factors that affect a tree's growth

Objectives:

1. Given instruction and examples, students will apply principles of dendrochronology to determine a tree's age.
2. Given instruction, students will become familiar with the vocabulary associated with the study of tree rings.

Teacher's introduction to the material:

Biologists and Botanists tell us about living things, but trees can reveal even the past. The study of tree rings can reveal conditions in the past, dry and wet years, diseases, even what year a building was built. Try to relate the study to what students experience themselves.

Tree ring cookies can be made by cutting slices of branches 3-4" in diameter or by cutting tree trunks for larger samples. City foresters will often make tree ring cookies for teachers during city tree trimming season.

Instruction:

1. Read the information on tree rings.
2. Investigate the tree ring example, and count its rings; that reveals its age.
3. Answer the questions about the Stump.
4. Complete the Be a Dendrochronologist questions.
5. Read the information on Factors that affect a tree's growth.

Skills: Life Science, Math, Physical Science, Reading comprehension.

Vocabulary: Cambian layer, Dendrochronology, False Ring, Heartwood, Phloem, Sapwood.

To Purchase Tree Cookies: Thune Enterprises, Sonya and Jerry Thune, 77407 145th Street, Sacred Heart MN 56285, (320) 765-2274, sonja@hcinet.net, 22 tree cookies of different species, dried and sanded, but not finished
Nature Watch, 800-228-5816, www.nature-watch.com 25/ \$17.25 Come with a string and a hole in each to make a necklace name tag.
The Forest Path, 560 E State Rd, Coldwater MI 49036, (517) 278-4364

Factors that affect the growth of a tree. (2011). *Division of Forestry, Minnesota Department of Natural Resources*. St. Paul, MN : State of Minnesota, Department of Natural Resources.

Tree-ring dating. *Learn NC, University of North Carolina School of Education*. Retrieved from:
<http://www.learnnc.org/lp/pages/1008>

Tree Rings: How a Tree Reveals its History

Most trees in temperate climates grow one layer of wood (one growth ring) a year. By counting the rings you can tell how old this tree was at the time it was cut. You can also count backwards from the date of the last formed layer to find the year when this tree was sprouted.

Growth rings form at the thin ***Cambian Layer*** between the back and solid wood; in spring a narrow, soft part of the layer forms. This is one growth ring. The cambium also grows the protective bark of the tree.

The light-colored rings toward the outside are called ***Sapwood***. These carry water from the roots to the leaves, where food is made for the tree. The inner bark, the ***Phloem***, carries the food to the other parts of the tree.

The older layers of sapwood eventually die. They become clogged with resin. This is the dark ***Heartwood*** in the center. It helps support the tree. In this particular tree, the resin makes the heartwood glow yellow (fluoresce) in “black light” (Ultraviolet).

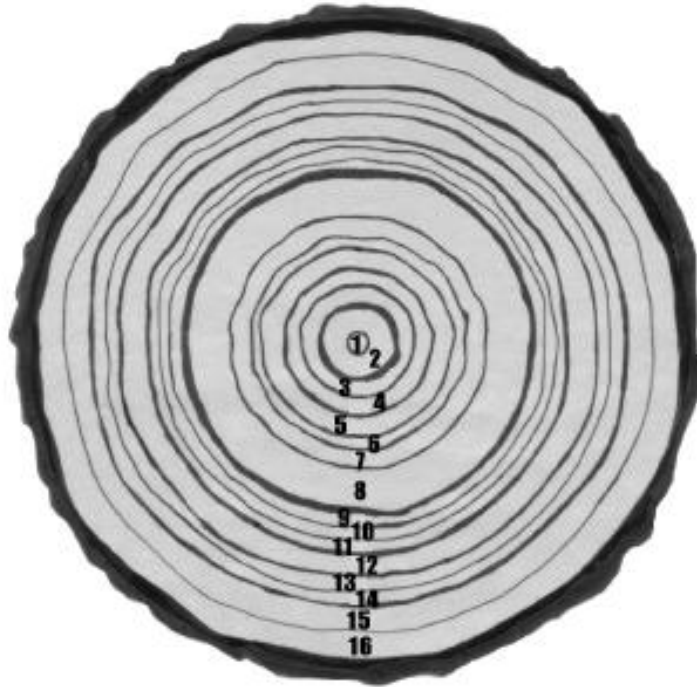
Narrow growth rings reveal times of ***drought***, shading by other trees, insect damage, or disease. Sometimes, the tree’s growth is interrupted and begins again during the same season, and then a ***False Ring*** appears. But these are much thinner and do not always extend completely around the tree.

Wider rings on one side of the tree indicate the tree leaned in this direction, and extra wood formed to support the tree. Knots and “V” shaped indentations of the rings are caused by the growth of branches.

Dendrochronology is the study of tree rings. From such studies, scientists can reconstruct past climate, and even date ancient wood artifacts.

The Stump

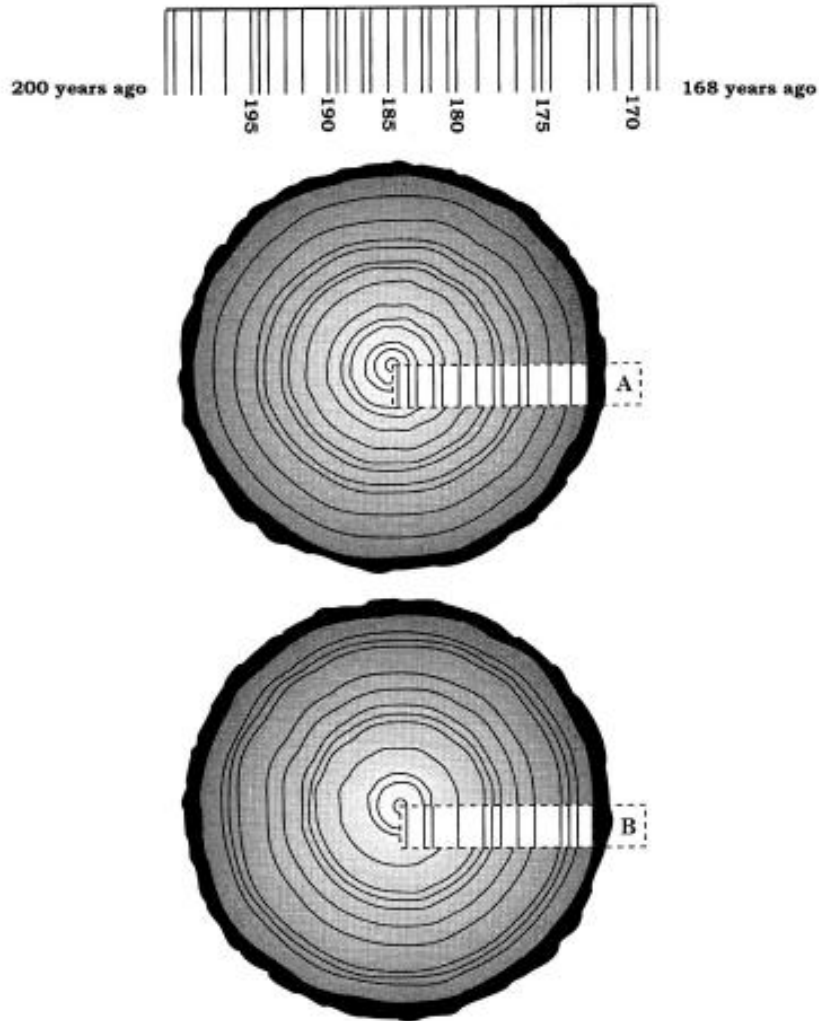
Name _____



1. This tree was cut three years ago. Write that year _____
2. How old was the tree? _____ years
3. What year did the tree start growing? _____
4. Find the ring that grew the year you were born. Was it a wet or dry year? _____
5. In what year of growth was there the least rainfall? _____
6. In what year of growth was there the most rainfall? _____
7. The dark area below the bark carries nutrition to the tree and is called the _____.
8. In the center is the _____.
9. Light colored rings towards the outside are the _____.
10. The study of tree rings is called _____.

Be a Dendrochronologist

Name _____



1. Name two things archeologists can tell from the study of tree rings?

2. Which of the two beams found at a building site is older, A or B? _____
3. How old was tree A when it was cut? _____
4. For tree A, list the dry years or cycles _____
5. How old was tree B when it was cut? _____
6. For tree B, list the wet years or cycles _____
7. How many years ago was tree B cut? _____
8. How long ago did tree A begin to grow? _____

The Stump

Answers

1. *2010 (if this year is 2012)*
2. *16 years old*
3. *1996 (if this year is 2012)*
4. *Depends upon child's age*
5. *10 (other close answers)*
6. *8*
7. *Phloem*
8. *Heartwood*
9. *Sapwood*
10. *Dendrochronology*

Be a Dendrochronologist

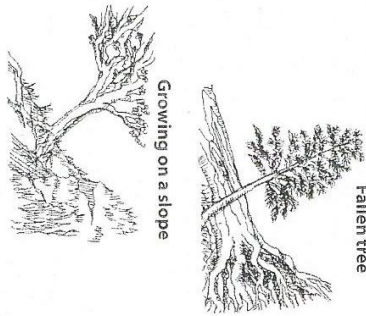
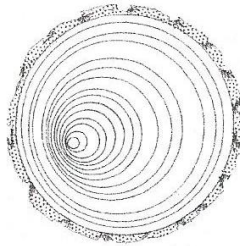
Answers

1. *Climate conditions in the past & age of the wood*
2. *B*
3. *13 years old*
4. *1st, 2nd, 4th, 8th, 10th*
5. *13 years old*
6. *4th, 5th, 10th*
7. *187 years ago*
8. *190 years ago*

Factors That Affect Tree Growth

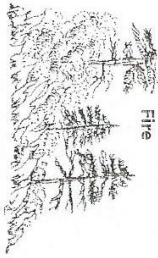
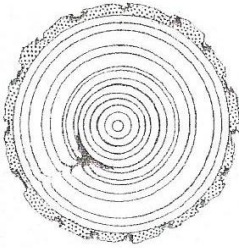
Cross Section A:

The uneven growth shown in the rings could have been caused by a fallen tree leaning against the tree. The tree grew more on one side than the other, and curved up around the fallen tree. This uneven ring pattern could also belong to a tree growing on a steep slope.



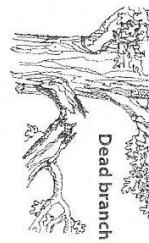
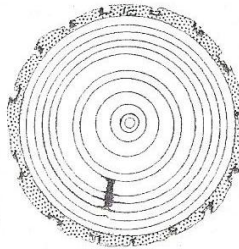
Cross Section B:

The scarring on this cross section was caused by a forest fire during the tree's sixth growing season.



Cross Section C:

The mark beginning in year six is all that's left of a branch that died and fell off. Eventually the tree's trunk grew around the remains of the branch and covered it. (The branch could also have been broken or cut off.)



Cross Section D:

The narrow rings shown in this cross section could have been caused by several things such as drought, heavy insect damage, or damage from construction. If a tree loses all or most of its leaves because of an insect attack or drought, it is not able to make food and grows very little that year. Root damage from the construction of a house or sidewalk too close to the tree reduces the water and minerals the roots can absorb.

