

TREE RINGS

We can find out a lot about a tree by looking at the rings in its trunk. To see the rings, we must look at a cross section of the trunk, just like this!

One ring usually stands for one year of the tree's life.

First year growth

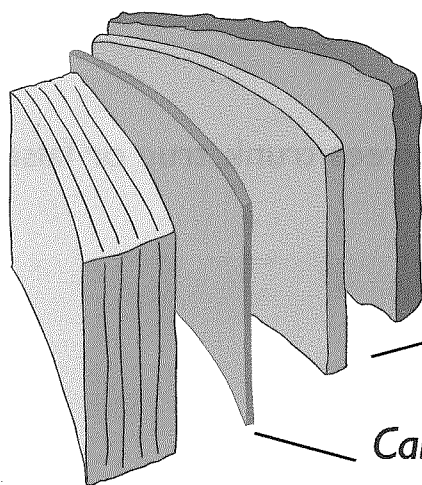
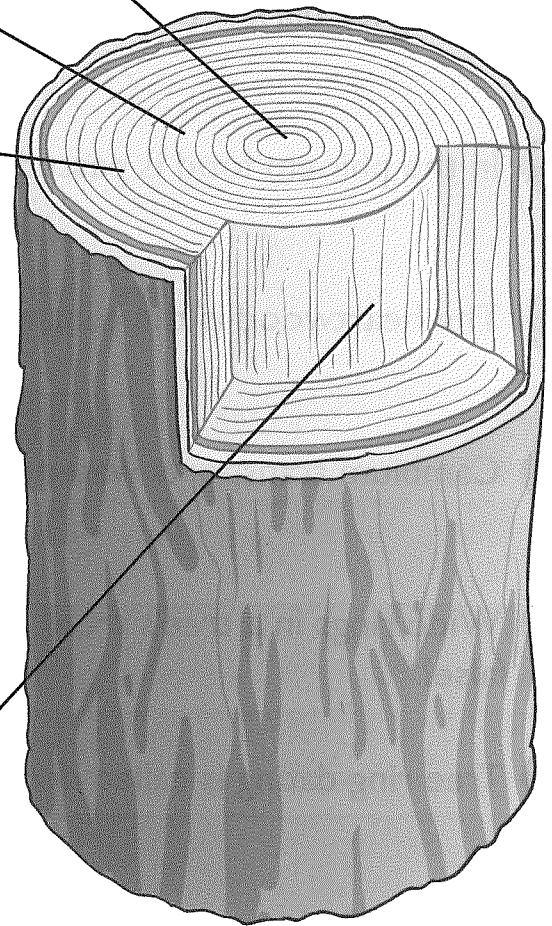
Rainy Season

Dry Season

Sometimes the rings are wide, which means that year was full of rain and good growth. Other times, the rings are thin, which means there was not enough rain that year.

Fun fact: Did you know that tree-ring dating is a scientific method called dendrochronology?

heartwood : central supporting pillar of the tree.



Outer bark: a tree's protective "skin" layer.

Inner bark or "phloem": food is passed to all of the tree.

Cambium: the cell layer that produces bark and new wood.

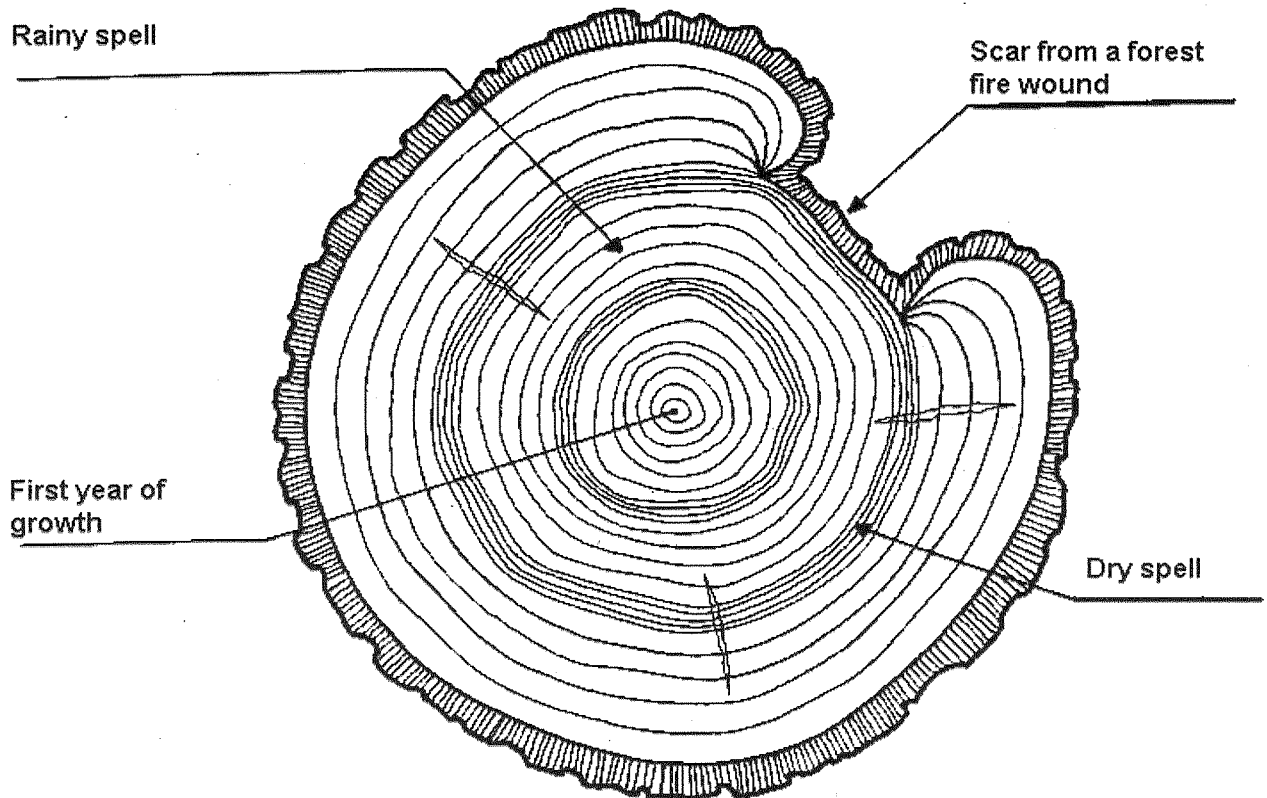
Sapwood or "Xylem": how water goes to all the tree.

TREE QUIZ

1. Each ring in a tree trunk stands for 5 years, true or false?
2. The inner bark is the "skin" of the tree, true or false?
3. In the phloem food is passed to all of the tree, true or false?
4. The heartwood is the central supporting pillar of the tree, true or false?
5. Cambium transports water to all the rest of the tree, true or false?
6. Wide rings in a tree's trunk means there has been a year full of rain, true or false?
7. Tree ring dating is called dendrochronology, true or false?
8. We can find out only little bits of information in the trees trunk, true or false?



Tree Ring Activity



The outer ring of this tree grew in 2011.

1. How old is this tree? _____
2. Locate the pointer marked **First year of growth**.
 - a. What year did this tree start to grow? (HINT: To calculate the tree's first year of growth: $2011 - \text{age of the tree} = \text{tree's first year of growth}$) _____
3. Locate the pointer marked **Scar from a forest fire wound**.
 - a. How many years ago did a forest fire wound the tree? (HINT: Count the number of rings between the damage mark and the outer ring.) _____
4. Locate the pointer marked **Dry spell**.
 - a. Note the annual layers are very narrow in this part of the tree record.
 - b. How many years ago did the drought start? (HINT: Count back from the outer ring to the earliest narrow ring that is closest to the *First year of growth*.) _____
 - c. How many years were in this dry spell? (HINT: Count the number of narrow rings in this area of the tree record.) _____
5. Locate the pointer marked **Rainy spell**. Note that the rings are wider in this area of the tree record.
 - a. How many years were in this rainy spell? (HINT: Count the number of wider rings in this area of the tree record.) _____

Tree Ring Exploration Handout

Driving Question: What paleoclimate evidence do tree rings provide?

In this activity you will:

1. Understand that trees add rings annually with lighter and darker layers that represent summer and winter growth.
2. Understand that the width and shape of the tree ring is dependent on environmental conditions.
3. A record of tree ring measurements is a paleoclimate proxy.



Background Information

Tree ring dating, or dendrochronology, is a very accurate indicator of long-term climate change. It is a very accurate indicator of climate change on the decadal (tens of years) to millennial (thousands of years) time scales. Trees grow well when local weather and climate conditions are favorable and grow poorly when they are not. Most trees add one annual growth ring each year. New rings are the result of new growth in the cambium layer just below the bark. The rings in the middle of the tree are oldest and the outer rings nearest the bark are the youngest.

A tree ring is composed of two layers:

- A **light colored layer** that grows in the spring and early summer.
- A **dark colored layer** that forms in late summer and the fall.

The cambium produces large cells in the spring when water is abundant and growing conditions are generally good. This is the **light part** of the tree ring. As the climate becomes **drier** later in the summer and the growing season ends in the fall, the cambium produces smaller cells that have thicker walls. This is the **dark part** of the tree ring. In the northern hemisphere, in the late autumn, tree growth stops.

The width of the ring is dependent on the precipitation available to the tree. Trees produce **wide rings** during **wet and cool** years. Tree rings are **narrow** during **hot and dry** (drought) years.

By combining living and dead tree records, scientists can extend tree-ring paleoclimatology records back hundreds to thousands of years. Scientists cross-reference climate data by matching patterns from several trees. Tree rings can provide evidence of natural disasters including volcanic eruptions, earthquakes, fire, lightning strikes, and insect, fungal or bacterial infestations. Growth patterns can also be altered by human actions that cause damage to the trees.



Activity Description

1. You will examine a tree ring record to explore a tree's history.
2. The image on the next page shows a tree ring record.
Each dark and white layer represents one complete year of growth.
The distance between two dark lines represents one annual layer (or one year) of growth.
3. The outer ring of this tree grew in 2011.
4. Examine the tree ring record and answer questions #1-5 on the next page.

Reading a Tree's Rings

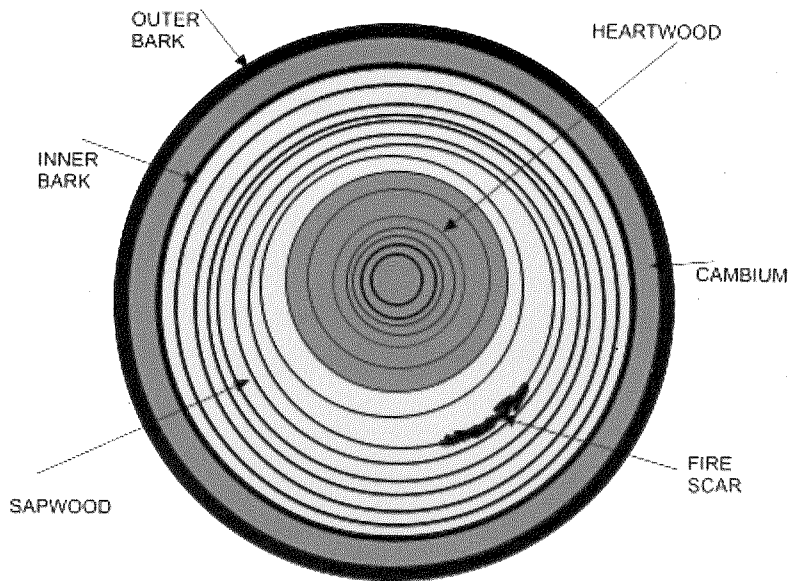
The outer bark is the protective outer layer of the trunk

The inner bark is the layer of the trunk through which the tree's food flows - it is located between the outer bark and the cambium. When this short-lived layer dies, it is called cork.

The cambium a single layer of living cells in the trunk that is located between the sapwood and the inner bark.

The heartwood is the core of the trunk, which contains very strong, dead tissue that supports the tree

The sapwood carries water and minerals between the roots, trunk, and branches. It is usually lighter in color than the heartwood.



Each ring represents one year. Larger gaps between the rings indicate more growth in a year. This could be due to more light due to thinning or better growing conditions (temperature, rain, etc.)

Draw your own tree ring diagram below:

TREE RINGS

