



LESSON SUMMARY

To give students an opportunity to examine the cross-section of a tree, determine its age, and make inferences about a tree's growth.

Activity Information

Grade Level:	Primary/Junior
Estimated Duration:	30 minutes to 1 hour
Materials:	Tree Disc photos and/or wooden tree discs, magnifying glass, metric rulers, pencils, paper
Setting:	Indoors or outdoors
Key Vocabulary:	Tree discs, annual rings, sapwood, heartwood

Forest Facts

- Foresters study tree cross-sections or discs in order to learn about the life histories of individual trees and to ascertain the history of the surrounding area (for example, the last fire in the area could be marked by a fire scar, the last drought by a very narrow growth ring). The study and interpretation of tree discs in this manner is referred to as dendrochronology (hence the title of this activity. "Dendro Discs").
- Trees form new wood in spring and summer only. Spring wood is lighter in colour than summer wood. This growth shows up in a series of light (spring growth) and dark (summer growth) rings called annual rings. Greater availability of moisture in the spring usually promotes faster growth in the tree. Because spring growth is generally faster than summer growth, the light rings are usually wider and lighter in colour than the summer growth.
- One light ring together with the adjacent darker outer ring represents one year's growth.
- The new layer of wood produced by a tree each year is an active part of the life of the tree, conducting sap and storing reserve food. As time passes and new layers are added to the outside of the tree, the older wood cells in the centre become inactive and stop transporting water and nutrients. The inactive wood cells build up deposits of various kinds of chemicals, which change their colour and cause them to show up as dark-coloured heartwood.
- Different kinds of trees build up different kinds and amounts of chemicals in the heartwood. This explains why not all trees show the same kind of development. Spruce and balsam fir have small amounts of chemical deposit in the heartwood, so it appears virtually the same as the sapwood. Some of the chemicals in the heartwood of white oak and cedar are toxic to certain fungi, making this wood very decay-resistant.
- Growth rings vary in size according to each year's growing season. Their size is influenced by environmental conditions such as weather, amount of growing space, soil condition, insect attacks, and fire. Annual rings can also differ on one side of the tree if the tree is compressed or has a lean while growing. These conditions may cause compressed rings on one side, and wider rings on the side that is not compressed.
- Dense forest conditions can cause compressed rings in trees. Pruning and thinning to create more space for trees can create wider tree rings.
- Did you know? Growth rings are more visible in temperate regions of the world, because the seasons differ more markedly.
- Increment borer- a common forestry tool that drills a small hole into a tree close to the base of the tree to extract a small core sample. These core samples shows a small sample of the tree cookie, and can help to determine the growing history of the tree. When only a few core samples are taken from a tree, they have very minimal impact on the tree.

ACTIVITY

1. Have your students examine the photos of the tree discs provided or study tree discs provided or study tree discs cut from the trunk of a discarded Christmas tree or firewood (these are sometimes referred to as “tree cookies”). If the discs are not round, ask them to describe the shape and speculate on how they became this shape.
2. Point out the pith and the dark wood at the centre of the tree disc (heartwood) and the light coloured wood around it (sapwood). Have your students find the spring growth rings (light wide rings) and the summer growth rings (dark narrow rings). Determine the tree’s age by counting the number of annual growth rings.
3. Compare the annual growth rings (either visually or by measuring the width). Which rings indicate especially fast or slow growth? What factors might have contributed to this difference?
4. Are there any unusual marks on the discs (e.g., dark areas, knots, cracks)? What might have caused these?
5. If possible, compare several different tree cookies from different sources. How do they differ in size, colour, shape, age, texture, and smell?
6. Have the students discuss the different effects that climate change may have on growth rings, based on the predicted changes in weather patterns and growing conditions.
7. Discuss the concept of pruning and thinning of forest stands with your students. What are the effects of these practices on growth rings?

Evaluation

1. Visit a forest and examine the stumps of recently cut trees. Have students count the growth rings to determine how old the tree was when it was cut. Notice the periods of fast and slow growths (indicate by wide and narrow growth rings).
2. Have students make a clay model of a tree disc (they can trace the growth rings with a sharp pencil) and write a description of the life history of that tree.
3. Make tree disc necklaces using the following materials:
 - Wooden discs approximately 6 mm to 9 mm thick and 5 cm in diameter, preferably cut from a type of wood native to the area
 - Urethane, shellac, or linseed oil for finishing
 - Sandpaper (80 and 120 grit)
 - Toothpicks or pine needles (for detailed painting)

- Water colours or acrylic paints
- India ink and calligraphy pens
- Drill and drill bits
- Cord to make a necklace approximately 40 cm or longer

Instructions

- Prepare discs by drilling a 6 mm hole in the top of each for the necklace cord.
- Have your students sand the discs on both sides until all the rough spots are removed. Start with coarse sand paper and switch to finer paper when scratches appear in the wood.
- Have your students use a pencil to sketch design onto the disc. Erase or sand off any mistakes. Provide them with India ink, water colour, or acrylic paints to complete the design.
- When the ink or paint is thoroughly dry, dip the disc into urethane. Allow excess urethane to run off and hang the disc up to dry.
- Apply three or four coats of urethane, making sure it is dry between each application. For a smooth finish, sand each dry layer lightly (except the last).
- Thread the necklace cord through the disc.

Note:

Wood can be cut on the diagonal to produce oblong shapes. However, these discs are more difficult to drill as the bit tends to follow the grain of the wood. When attaching the cord, use a lark's head knot through the hole in the disc. Tie the ends together with a reef knot.



