Tree Characteristics

NAAEE Guidelines for Learning:

4th Grade

Strands I C, E, G; 2.2 A, B, C, D

5th - 8th Grade

Strands I C, E, G; 2.2 A, B, C, D

Lesson Outcomes:

Students will understand...

- that trees have species-specific characteristics
- that there are a variety of seed types, each of which employs a different **propagation** strategy
- why trees are beneficial to the environment
- that there are many science-related careers that involve studying trees

Students will be able to...

- identify basic **dendrology** and **botany** terms
- use a tree key to identify tree species
- recognize several native trees common to the Potomac River **watershed**
- use the Internet to research environmental professions that involve the study of trees

Duration of Activity:

Two hours

Vocabulary Words:

Adaptation, alternate, catkins, compound leaf, cones, conifer, deciduous, ecosystems functions, entire, evergreen, horticulture, fruit, leaf scar, lobes, midrib, margin, microbiotic, opposite, palmate, persistent, petiole, pinnate, photosynthesis, seedlings, simple leaf, silviculture, spurs, transpiration

Setting:

Indoors and outdoors

Materials:

Student Pages:

1. "Sample Trees:" One printed copy per study, plus one copy printed on a transparency
2. "Parts of a Tree:" One printed copy per student, folded into a booklet and stapled together
3. " Crossword Puzzle: Parts of a Tree:" One printed copy per student
4. "Tree Key:" One printed copy (single-sided) per student
5. "Workers in the Woods:" One set, printed, cut and (optional) laminated
6. "Tree Journal:" One printed copy per student

Teacher Page:

1. "Dendrology Crossword Puzzle Key"

- Dichotomous keys: 11 sets (refer to the resource list for where to purchase dichotomous keys. A good and inexpensive book is the National Arbor Day Foundation's "What Tree Is That?", available online at http://www.treelink.org/whattree/index.htm.)
- Leaves gathered from outside
- Access to an outdoor area containing trees of differing species

Summary

In this activity, students will use a hands-on approach to identify and recognize native tree species by using real trees and a tree key. They will discover science-related careers that involve **dendrology**.

Background Information

Although to the casual observer, trees may appear identical to one another, each **species** has qualities that distinguish it from other species. To accurately identify a tree, it is necessary to consider a number of characteristics, including those regarding the tree's form, trunk, bark, branches, leaves, flowers, and seeds.

A **dichotomous key** is designed to determine the species assignment of a living thing. There are dichotomous keys for animals and plants. Using scientific vocabulary specific to the category of living thing (e.g. trees), such a key involves a series of questions for which each answer determines the next question. In answering the questions, the user ultimately narrows down the kind of living thing—from its **family** level all the way to its **genus** and species designations.

Some tree keys are leaf-based, in which case, a tree may be identified simply from the shape and arrangement of its leaves. Such keys are commonly used for field identification. Other keys are based on tree twigs, bark, and buds. These type of keys are especially useful during the winter, when leaves are not present on **deciduous** trees.

Although no two tree keys are identical, they usually include a glossary and individualized instructions for navigating through the key. Using keys can seem challenging at first, but can prove extremely useful and fun. Novices, hobbyists, and professionals alike use a variety of field guides to increase their knowledge of trees and to refine their observation skills.

There are many professions that involve the study of trees, each with a different focus. For instance, foresters practice **silviculture**, sustainably managing forest communities or woodlands to produce trees for harvest, wildlife, or recreational use, and to provide benefits to humans. This is vastly different from naturalists, who study trees' relationships to wildlife and overall ecosystems. **Botanists** research how trees function, while **horticulturists** focus on **propagation** or even the genetic modification of trees for ornamental uses. **Arborists** are experts in tree health and general care, such as pruning and disease management. Whatever the area of specialization, these professionals must know how to identify trees.

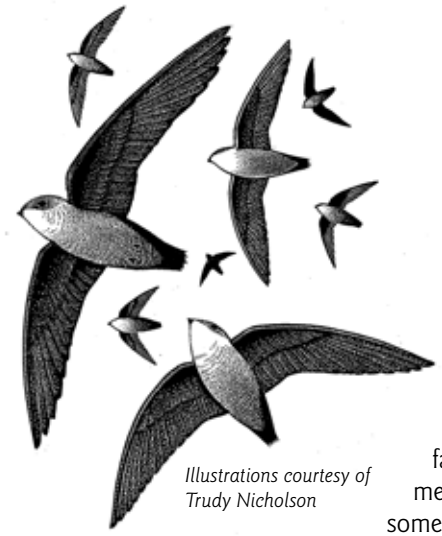
Essential Questions

- How are different species of trees similar?
- How can you tell trees species apart?
- Who studies trees and why?

Pre-assessment Show students the illustrations in "Sample Trees" on an overhead projector and ask them if they think the trees are all the same. Students should be able to tell you that they are not. Ask them how they are different. Invite them to share what they know about tree forms (e.g. shape, size, etc.), leaf characteristics, flowers, and other parts and aspects of trees. Present the Essential Questions and lead a class discussion about ways in which different tree species are similar, and ways in which they are different.

Lesson Procedures

1 Distribute one copy of "Parts of a Tree" and "Crossword Puzzle: Parts of a Tree" to each student. For homework, assign students to read "Parts of a Tree" to become familiar with dendrology terms, and to use this information to work on the "Crossword Puzzle: Parts of a Tree." Assure them that if they are uncertain about any of the terms, they will have a chance to complete the puzzle at the end of the Lesson.



Illustrations courtesy of Trudy Nicholson

2 Present to the class the concept of a tree key, explaining the basic features. Discuss the importance of reviewing a key's instructions and glossary; that keys work by observing various characteristics; and that the steps of a key work through a process of elimination.

3 Pass out the "Tree Key," which is a simplified key that will help prepare the students to use a more complicated dichotomous key. Repost "Sample Trees" on the overhead projector and, as a class, walk through the steps of using the key to "key out" (identify) two of the trees represented on the overhead to familiarize the students with using the key. Have students work individually to key out the remaining three species. Give them time to compare their answers with their classmates. They should come up with the following answers:

1. Northern red oak (*Quercus rubra*)
2. Tulip poplar (*Liriodendron tulipifera*)
3. White oak (*Quercus alba*)
4. Black walnut (*Juglans nigra*)
5. Flowering dogwood (*Cornus florida*)

4 Divide students into groups of two to four and pass out one "Workers in the Woods" card to each group. (This activity includes 11 cards, so determine group size such that all 11 cards are assigned.) Each card describes a profession for which it is useful to know how to identify trees. Tell students to read their cards and prepare to play the role of someone with the career described on their card.

5 Pass out a dichotomous key booklet to each group. Review how to use the specific key and vocabulary terms. Go outside and, together as a class, key out one tree. Each group should follow along with his/her own key as the species is identified. Before moving to the next step, ensure that all students know how to use key; this may require keying out additional tree species.

6 Stay outside and have each group, in the character of the profession on its "Workers in the Woods" card, research a specific tree. Give each group a "Tree Journal" worksheet and assign the group a tree to collect information from by completing the worksheet. The students will need their dichotomous key to complete the "Tree Journal."

7 Return to the classroom and allow time for the students to finalize their "Tree Journals." Provide additional time for the groups to research (online or in the library) what facts and details, in addition to those already mentioned on their "Workers in the Woods" card, someone in their profession would need to know about the tree they identified.

8 Assign each group to create a large poster to illustrate what they gathered in their "Tree Journal," as well as what they researched about their profession. They should include information about the shape and size of the tree that they identified, where they found it, the defining characteristics (if any) of its leaves and twigs, and any details they were able to gather about its flowers, fruits, and bark. They should also include information about what and why someone in their profession would want to know about this tree.

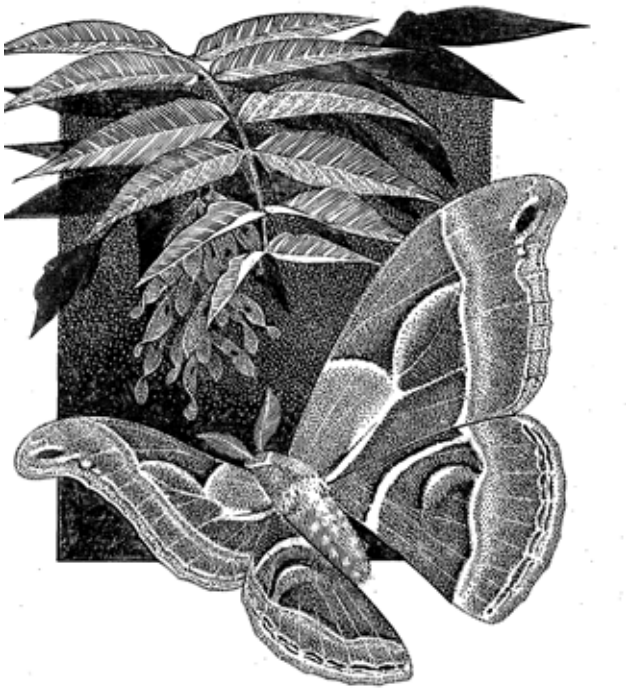
9 Ask each group to present their poster to the rest of the class, assuming the character of the profession it researched.

Post-assessment

Review the Essential Questions discussed at the beginning of the Lesson, and ask students if they have changed any of their initial ideas since learning more about identifying trees. Encourage students to use their new knowledge of dendrology terms by completing any of the "Dendrology Crossword Puzzle" that they had to leave blank at the beginning of the Lesson. To assess students' grasp of identifying trees, distribute one printed copy of "Sample Trees" to each student and assign them to use the "Tree Key" to write the correct tree species beside each illustration. Collect their worksheets to measure their performance.

Extensions

- Play the *Growing Native* Tree Stumpers Bingo and Tree Stumpers Memory games. Visit www.growingnative.org to download both of these games, which teach students how to identify native trees of the Potomac River watershed. Complete instructions are included on the web site.
- Make a classroom tree journal, using elements of the posters that each group made. Lead the students in conducting a survey of the school grounds or a nearby park to identify the trees within the area. Include at least one page in the tree journal for each species that you encounter. This offers an excellent opportunity for an ongoing group research activity that could culminate in a book. Your students can present this research project to other classes to teach them about the trees in your community.
- Participate in a scavenger hunt in the wooded area where you practiced the classroom tree identification activity. Tie a ribbon and a numbered tag around one example of each of the tree species on which the students presented. Ask students to use a dichotomous key to find one of each species that you have numbered.



Take Action:

Encourage students to:

- Adopt a tree by planting it in their yard.
- Raise money to purchase and donate a tree where it is needed along a degraded stream in their community. A number of programs facilitate this kind of sponsorship, including TreeMendous (www.dnr.state.md.us/forests/treemendous) and American Forests (www.americanforests.org).
- Ask local garden stores to sell and promote the use of native plants.

Additional Resources:

- Alice Ferguson Foundation's "Bridging the Watershed:" http://www.bridgingthewatershed.org/index.html.
- Butler University, Friesner Herbarium, Department of Biology's "How to Identify Trees:" http://www.butler.edu/herbarium/tree-id/idintro.html.
- Dendrology at Virginia Tech's "ID Keys:" http://www.cnr.vt.edu/dendro/dendrology/idit.htm.
- West Virginia University Extension Service's *Tree Identification 4-H Project*: http://www.wvu.edu/~exten/infores/pubs/fypubs/4htreeid.pdf.
- Maryland Department of Natural Resources' "Native Trees and Shrubs:" http://www.dnr.state.md.us/criticalarea/trees.html.
- The National Arbor Day Foundation's *What Tree is That?: A guide to the more common trees found in the Eastern and Central U.S.:* http://www.treelink.org/whattree/index.htm.
- Ohio Public Library Information Network's "What Tree Is It?:" http://www.oplin.org/tree/index.html.
- Pennsylvania Department of Conservation and Natural Resources' "Common Trees of Pennsylvania:" http://www.dcnr.state.pa.us/forestry/commontr/.
- Virginia Department of Forestry's *Common Native Trees of Virginia: Tree Identification Guide:* http://www.dof.virginia.gov/trees/index.shtml.