National Park Service
U.S. Department of the Interior

Old-Growth Bottomland Forest Research
and Education Center

Congaree National Park

100 National Park Road
Hopkins, SC, 29061
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Congaree K12 Lesson Plan

Lesson: Leaf Classification

Grade Level:	Fourth
Duration:	60 90 Minutes
Objective:	To identify 10 common trees at Congaree National Park using leaves, bark, fruit, and roots
Curricular Areas:	Science, English Language Arts

Unit Description:

Congaree National Park (www.nps.gov/cong) protects the largest intact tract of old-growth bottomland forest remaining in North America. This tract represents one of the last, best examples of an ecosystem that once covered more than 52 million acres in the southeastern United States. Congaree National Park is recognized as a National Natural Landmark, an International Biosphere Reserve and a Globally Important Bird Area. The park also encompasses approximately 15,000 acres of Federally-designated Wilderness and is home to Cedar Creek, which is recognized as the only reach of Outstanding National Resource Waters in South Carolina.

Lesson Description:

The essential purpose of this lesson is to teach students how to identify 10 common trees at Congaree National Park. This activity encourages students to identify tree species based on observations of leaves.

Essential Questions:

1. How do we describe trees?
2. How can we sort the leaves of the tree in Congaree National Park?
3. How can we identify the trees of the tree in Congaree National Park?

Preparation:

Teacher Background

1. This lesson is designed to be taught in a 60 minute session.

Prerequisite Student Knowledge

- Students are expected to have knowledge of the life cycles and adaptations of seed plants.
- Students are expected to have a basic understanding of flowering and nonflowering plants.
- Students are *not* expected to have previous plant identification experience.

Vocabulary

Angiosperm	Forest	Oblong
Community	Gymnosperm	Old-growth forest
Ecosystem	Lobed	Plant
Flowering plant	Non-flowering plant	

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Key Materials and Equipment
1. Flowering / Non-flowering plant poster
2. Leaf identification basics poster
3. Datasheet
4. A variety of different leaves for sorting
5. Common tree identification sheets

Teacher Preparation (15 minutes)
1. Collect leaves to be used for the leaf sorting activity
2. Print and organize materials, including posters and handouts

Instructional Objectives using the "5E" Model:

Engagement "How do we describe trees?" (10 minutes):

1. Present the following writing prompt to students and encourage them to brainstorm and respond to the question: *What Makes a Tree, a Tree?*

2. Have students talk with a partner to brainstorm characteristics of trees. Let student pairs share their responses aloud, while the instructor records main ideas on the board.

3. In addition to other characteristics, emphasize the three specific characteristics that distinguish a tree as a tree.

    a. A tree is at least 13 feet in height at maturity.

    b. A tree is at least three inches in Diameter at Breast Height (DBH), which is equivalent to 4 ½ feet above the ground.

    c. A tree has a defined crown.

4. Tell students: Of all of the characteristics of trees, we use the leaves to identify trees in Congaree National Park. This is because they are easy to see from a distance and are distinct to each type of tree. Let's continue to explore the leaves of the trees in the Park.

Exploration (at School Site) (20 minutes):

1. Take the students on a "Leaf Walk" around their school grounds. (If taking a group walk is difficult to arrange, perhaps students can bring leaves in from home.)

2. During the "Leaf Walk," each student can bring a bag for collecting leaves. Encourage students to collect a variety of leaves.

3. During the walk, ask students questions such as:

    a. Where do you see leaves?

    b. Do you see leaves anywhere else?

    c. What do you notice about the leaves?

    d. What do you notice about the trees?

    e. Do all the trees have the same kind of leaves?

    f. Besides leaves, what other parts of a tree can you see?

(If it is not a good time of year for viewing leaves on trees, you could have students look through books or online photographs of leaves.)

4. After the "Leaf Walk", give students time to write down what they observe about several leaves. As a group, show and discus features of different leaves they have collected. Are they alike? Are the different? How so?

5. Ask students to sort through and make several piles of their leaves based on their characteristics. Allow students to share how they sorted/grouped their leaves and what features they used.

6. Tell them that many scientists, such as biologist, group organisms based on their features. We call this classifying.

7. Give students more opportunities to reclassify their leaves based on its features.

Engagement (At Congaree) . I hear you have been learning about biologist and how they like to classify leaves! We have a lot of leaves here at Congaree to investigate! But before we do, what can you tell me about the leaves you have been observing?

Exploration (10 minutes) How can we sort the leaves of the tree in Congaree National Park?

1. Divide students into groups of three to four students, making sure each group has a table at which to work.

2. Provide a collection of leaves from the trees in Congaree National Park (or leaf pictures if no leaves are available) for each group. Explain that they are going to continue being biologist but that you need help classifying the leaves from right here in Congaree.

3. Prompt Students: *How can I classify leaves?* Let them share their ideas from the engagement they did prior to coming.

4. Reinforce their Students should observe the leaves and decide how they want to sort the leaves. The number of groups and the characteristic for sorting is determined by the group.

5. Encourage students to find an additional way to sort the leaves.

6. Let each group share how they sorted the leaves.

Elaboration (20 minutes) How can we identify the trees of the tree in Congaree National Park?

1. After discussing the various characteristics of the leaves, guide students to consider the two main ways that leaves are identified in the Park – lobe and edge.

2. Introduce students to the Basic Broadleaf Classification chart for identifying leaves. (p. 10 of 'small'.pdf)

3. Sort the leaves from the Exploration again using these traits.

4. Distribute common tree identification sheets to help students prepare for the tree identification walk.

5. Instruct students not to touch any plants during the tree identification walk, especially in areas where poisonous plants are prevalent. *Note: If the students are not familiar with poison ivy, the instructor should point it out.*

6. Instruct students NOT to pull leaves, bark, fruit, or any other tree parts from a tree. Not only is defacing a tree illegal in a National Park, it also compromises the tree's health and demonstrates a lack of respect toward the environment.

Extension (20 minutes) Tree Identification Walk

1. Lead students on the tree identification walk and urge them to work alone or in pairs to identify trees using the common tree identification sheets and their classroom experience.

2. Stop along the walking route to identify common trees by leaves, bark, and fruit as they are encountered.

3. Allow students to explore other elements of the environment, but keep the main focus on trees and other plants.

Evaluation

1. No evaluation is currently used, but students are invited to write journal entries about their experiences at camp.

Standards Correlations

Core Science Standards (2005):

4-1.1: Classify observations as either quantitative or qualitative.

4-1.7: Use appropriate safety procedures when conducting and investigation.

4-2.1: Classify organisms into major groups (including plants or animals, flowering or nonflowering plants, and vertebrates [fish, amphibians, reptiles, birds, and mammals] or invertebrates) according to their physical characteristics.

Core Science Standards (2014):

Standard 4.L.5: The student will demonstrate an understanding of how the structural characteristics and traits of plants and animals allow them to survive, grow, and reproduce.

4.L.5A. Conceptual Understanding: Scientists have identified and classified many types of plants and animals. Each plant or animal has a unique pattern of growth and development called a life cycle. Some characteristics (traits) that organisms have are inherited and some result from interactions with the environment.

Performance Indicators: Students who demonstrate this understanding can:
4.L.5A.1 Obtain and communicate information about the characteristics of plants and animals to develop models which classify plants as flowering or nonflowering and animals as vertebrate or invertebrate.
4.L.5A.2 Analyze and interpret data from observations and measurements to compare the stages of development of different seed plants.

Other Science and Allied Standards:

English Language Arts

4-W2.1: Demonstrate the ability to use writing to explain and inform.

4-W2.2: Continue using writing to learn, entertain, and describe.

4-C1.1: Demonstrate the ability to face an audience, make eye contact, and use the appropriate voice level.

4C1.4: Demonstrate the ability to participate in conversations and discussions by responding appropriately.

4-C2.1: Demonstrate the ability to follow multi-step oral directions.

4-C2.2: Demonstrate the ability to listen for meaning in conversations and discussions.

4-C2.5: Demonstrate the ability to distinguish between fact and opinion, comparing and contrasting information and ideas, and making inferences with regard to what he or she has heard.

4-RS3.2: Demonstrate the ability to organize information on the basis of observation.

Attachments:

- Flowering / Non-flowering plant poster
- Leaf identification basics poster
- Datasheet
- Leaf rubbing worksheets
- Common tree identification sheets

Resources:

1. Congaree National Park website: www.nps.gov/cong
2. Please contact David Shelley for more information:

Acknowledgements:

This lesson was initially designed by Erin Eberstein as a Student Conservation Association (SCA) Environmental Education Intern at the Old-Growth Bottomland Forest Research and Education Center. This lesson was significantly edited and augmented by Dana Hutto with the University of South Carolina.

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Congaree Dendrology

Scientific Group	Gymnosperm ("exposed" seeds)	Angiosperm ("contained" seeds)
Flowering?	No	Yes
Leaf type Normal Annual Leaf Pattern	Needles "evergreen" - does not lose leaves in the fall	
Interesting Congaree Facts	Bald Cypress is a deciduous gymnosperm! It has needles and cones, but looses its needles every fall.	Holly is an evergreen angiosperm! It has broadleaves and flowers, but does not lose its leaves every fall.
Interesting Facts	The tallest trees on earth are gymnosperms!	There are over 300,000 species of angiosperms, making them the most diverse group of plants on earth!

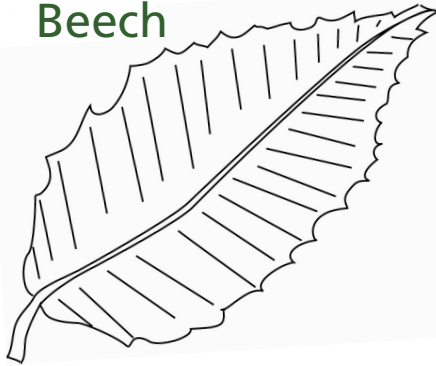# Basic Broadleaf Classification

SERRATED "Jagged"

EDGE

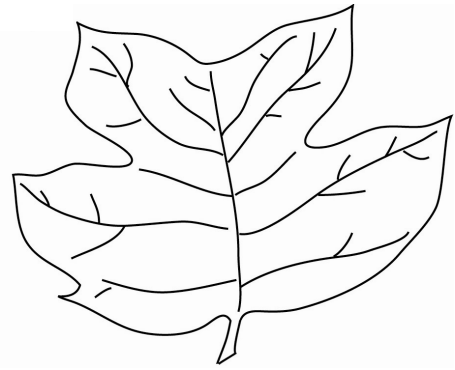**SMOOTH** "Smooth"

OBLONG "Football"

SHAPE

LOBED "Star"

American Beech

Paw Paw

Sweetgum

Tulip Poplar

Congaree Tree ID

Leaf Rubbing Sheet

Name:_____ **Date:_____**

[blank box for leaf rubbing]

Tree Name: _____

Leaf Data (Circle or fill in)

Non-Flowering Tree (Needle-leaved)	Needle length: _____	Needles per bundle: _____

OR

Flowering Tree (Broad-leaved)	Shape:	Oblong	Lobed
	Edges:	Smooth	Serrated

Notes (color, veins, fruit, cones, etc.):