

**TEACHING KATE
TEACHING KIDS ABOUT THE ENVIRONMENT**

IDENTIFICATION OF TREES AND POPULATION ESTIMATES BY SAMPLING

Grade Level: 6

Time Required:

SC Science Standards

This lesson plan was correlated with only the grade level specified unless otherwise noted.

- I. A. 1. b. 2
- I. A. 1. c. 1
- I. A. 1. e. 1
- I. A. 2. f.
- I. A. 7. a, c
- II. C. 1. d, e, f
- II. C. 3. b.

Purpose

Students will learn how to identify different species of common South Carolina trees using leaf and growth characteristics. A sampling technique to determine population estimates will be used in a wooded area in the community to determine populations of identified trees.

Skills

Application, classification, estimation, identification, measurement, observation.

Concepts

Characteristics or traits of all trees can be used for specific identification; random sampling of a large area is one method used to obtain population estimates.

Materials Needed

Samples Of Different Tree Limbs — One Of Each Species Per Group
 Copies Of Pages 19-24 Of Familiar Trees Of South Carolina For Each Student
 Copies Of Familiar Trees Of South Carolina For Each Group
 Meter Sticks Or Pieces Of Rope Measured To 1 Meter
 Worksheets Sharpee Or White-out
 Baskets (1 per group) Carpenter's Ribbon For Tree Tags
 Metric Rulers Stakes (4 per group)

Definition of Terms

<u>Alternate</u>	Leaves arranged singly at intervals along the stems.
<u>Broadleaf</u>	Wider leafed, usually deciduous.
<u>Compound</u>	A type of leaf that has 3 or more leaflets attached to a common stalk.
<u>Conifer</u>	A tree that bears cones and has needle-like leaves.
<u>Dichotomous Key</u>	A key for identification based on a series of choices between alternative characters.
<u>Diversity</u>	Variety of species or habitats.
<u>Entire Margin</u>	Smooth without teeth or lobes.
<u>Lateral</u>	Along the side of the branch.
<u>Lobed Margin</u>	A segmented leaf having pointed or rounded extensions separated by sinuses that do not extend more than half way to the mid-rib.
<u>Margin</u>	The edge.
<u>Opposite</u>	Leaves occurring in pairs at the nodes, or where the leaf is attached to the stem.
<u>Petiole</u>	Stalk of a leaf.
<u>Population</u>	All the members of a species that inhabit a defined geographical area.

<u>Rachis</u>	The mid-rib of a compound leaf.
<u>Serrate Margin</u>	Margin that has pointed teeth that are directed upward.
<u>Simple</u>	Leaf consisting of one single blade.
<u>Sinuses</u>	Indentation or space between lobes.
<u>Terminal</u>	At the end.
<u>Truncate</u>	Abruptly cut off.
<u>Whorled</u>	Leaves occurring three or more at a single node.

Before the Session

Session 1

Make copies of worksheets A and B for each student. Gather samples of different tree stems showing some basic characteristics as seen on the table on worksheet B. One sample of each species is needed for each cooperative group. Use a sharpee or white-out to number each sample of each species. Place each collection in a basket to give each group.

Session 2

Procure enough copies of Familiar Trees of South Carolina for each group. Make copies of pages 19-24 for each student. Obtain enough carpenter's ribbon (obtainable at hardware stores) to give each group a strip for tagging a tree.

Session 3

Make copies of worksheet C for each student. Procure metric rulers for each student.

Session 4

Gather meter sticks for each group or a piece of rope measured to one meter. Make copies of worksheet D for each student. Procure stakes, 4 per group, to mark corners of sampling plot.

Background Information

By looking at certain characteristics of a leaf and its growth, along with the bark and growth pattern of a tree, biologists can make an identification. The key and definition of characteristics found in Familiar Trees of South Carolina can be used to identify most of the major tree species found in any area of South Carolina.

When biologists want to know the number of living things in a given area, they can select from several different counting methods. The best data for a plant species would be from counting the entire population. However, this method is impractical and very time consuming. A more practical method is to count a small sample of the population in several randomly selected areas, then multiplying the average sampling by the number of times larger the total site is to get a population estimate on the entire area.

Suggested Lesson Plan

Session 1

1. Discuss things we use to help us identify items. Lead the students to think of ways we can identify trees.
2. Give each student the key showing some characteristics of a leaf of a tree. (Worksheet A.)
3. Group student into small groups, giving each group a basket containing 4-6 different stem/leaf samples collected for this purpose. Each must be numbered. Ask students to match each sample with any characteristics it has using worksheet B.
4. Have each group make a dichotomous key using the leaf samples from the basket. (See example A.)

Session 2

1. Review the leaf characteristics used in Session 1. Extend this by giving each student pages 19-24 of Familiar Trees of South Carolina to help in identifying tree species.
2. Form small groups of 2-4 students. Give each group a copy of Familiar Trees of South Carolina. Go over how the key can be used for identification of a tree.
3. Take the class to a wooded area where each group is to choose a tree and tag it by tying the ribbon around it with their name or number on the ribbon. (Encourage little or no duplication.)

4. Each group must use the key, recording the characteristics for identification of their tree.
5. Each group must then show the rest of the class their tree and communicate the defining traits used for identification.

Session 3

1. Discuss possible ways to determine a population within an area. Introduce the idea of random sampling of populations and how such considerations are necessary in estimating population size.
2. Give each student a copy of worksheet C. Have them mark the sheet off into 2 cm squares. (100 squares will result.) Have each estimate the number of dots.
3. Have them randomly select 10 different squares in different areas on the paper.
4. They are to count the number of dots in each selected square and record on a data sheet. Count the dots completely in the square and those touching the left and top lines of each square.
5. Have each calculate the average of the total number of dots recorded from the 10 samplings. Record the average. (See example B).
6. Have them multiply the average by 100, the total number of squares in the large square. This is the estimated number of dots.

Session 4

1. Take students back to the wooded area visited in Session 2. Have them review the characteristics of their tree and observe the species at various stages of maturity. The object is to become familiar enough with the tree to easily recognize it for population estimate purposes.
2. Ask each group to take random samplings 10 m X 10 m, counting the number of their trees present in each sampling. Use worksheet D to record data. There should be 5-10 samplings taken throughout the area.
3. As a class, or each group, determine the measurements of the perimeter of the area. Try to round to the nearest 10. (i.e. 60 X 60, 100 X 100 or 40 X 60.)
4. Using the same principle from session 3, have students compute the estimated population of their tree in this forest.

5. In the classroom, collect data from each group and have every student record all the data. Use this information to discuss diversity, reasons for differences in populations (fertility of soil, amount of moisture in the soil, amount of canopy, climate, etc.), etc.

Application

One concern facing our state and nation is how to best manage forests. To be able to do this, we must be able to identify the vegetation on site. Many other factors, such as soil quality, nutrient availability and moisture must be analyzed along with many interactions. Taking a population estimate is one way to analyze a site to determine what is in an area. It also is used to determine success rates for newly planted forests.

Extension

Session 2

Do “Adopt A Tree” from [Project Learning Tree](#). Have students write a poem about their tree. (See “Poet Tree” from [Project Learning Tree](#).)

Resources Available

Familiar Trees of South Carolina, A Manual for Tree Study. South Carolina Forestry Commission in Cooperation with Clemson University Cooperative Extension Service, Clemson, S. C. 29634-0310.

Project Learning Tree. American Forest Foundation, 1111 19th Street, NW, Washington, D. C. 20036.

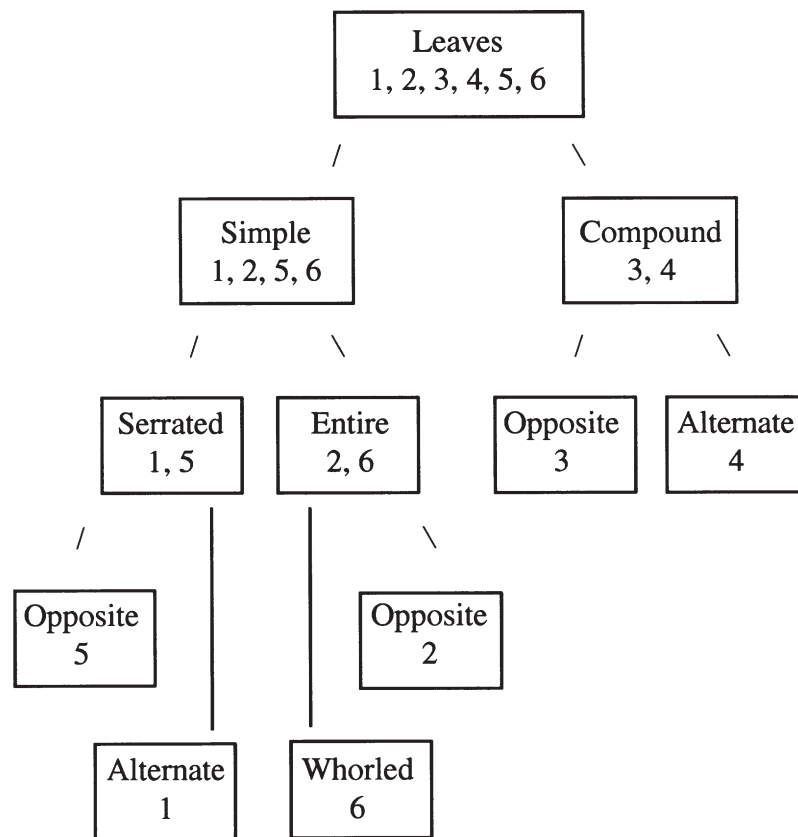
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EXAMPLE A- DICHOTOMOUS KEY

This is only to show the form of a dichotomous key. There may be many variations even within the class, depending upon which characteristic the students use for the first grouping.



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EXAMPLE B — SAMPLING

Sample	Number of Dots
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Average =	

Estimated Number of Dots =
(Average X 100)

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WORKSHEET A — LEAF CHARACTERISTICS

Name:

Date:

Group:

LEAF CHARACTERISTICS

Leaf Arrangement



Alternate

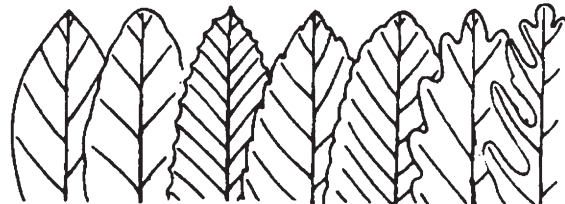


Opposite



Whorled

Leaf Margins

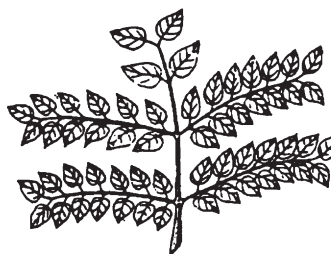


Entire Undulate Dentate Serrate Crenate Lobed Parted
* * *

Leaf Composition



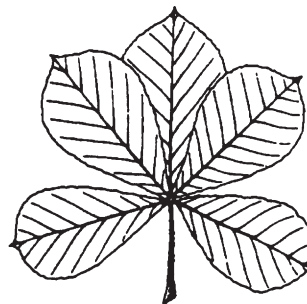
Simple Leaf



Bi-Pinnately Compound Leaf



Pinnately Compound Leaf



Palmately Compound Leaf

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WORKSHEET B — CHARACTERISTICS OF SAMPLE LEAVES

Name:

Date:

Group:

Write the corresponding number on the leaf to match each characteristic. Some leaves will be used more than once. Place them by each characteristic that is demonstrated on the sample.

Leaf Characteristic	Leaf Number
A. Alternate	
B. Opposite	
C. Whorled	
D. Simple	
E. Compound	
F. Entire Leaf Margin	
G. Lobed Margin	
H. Serrate Margin	

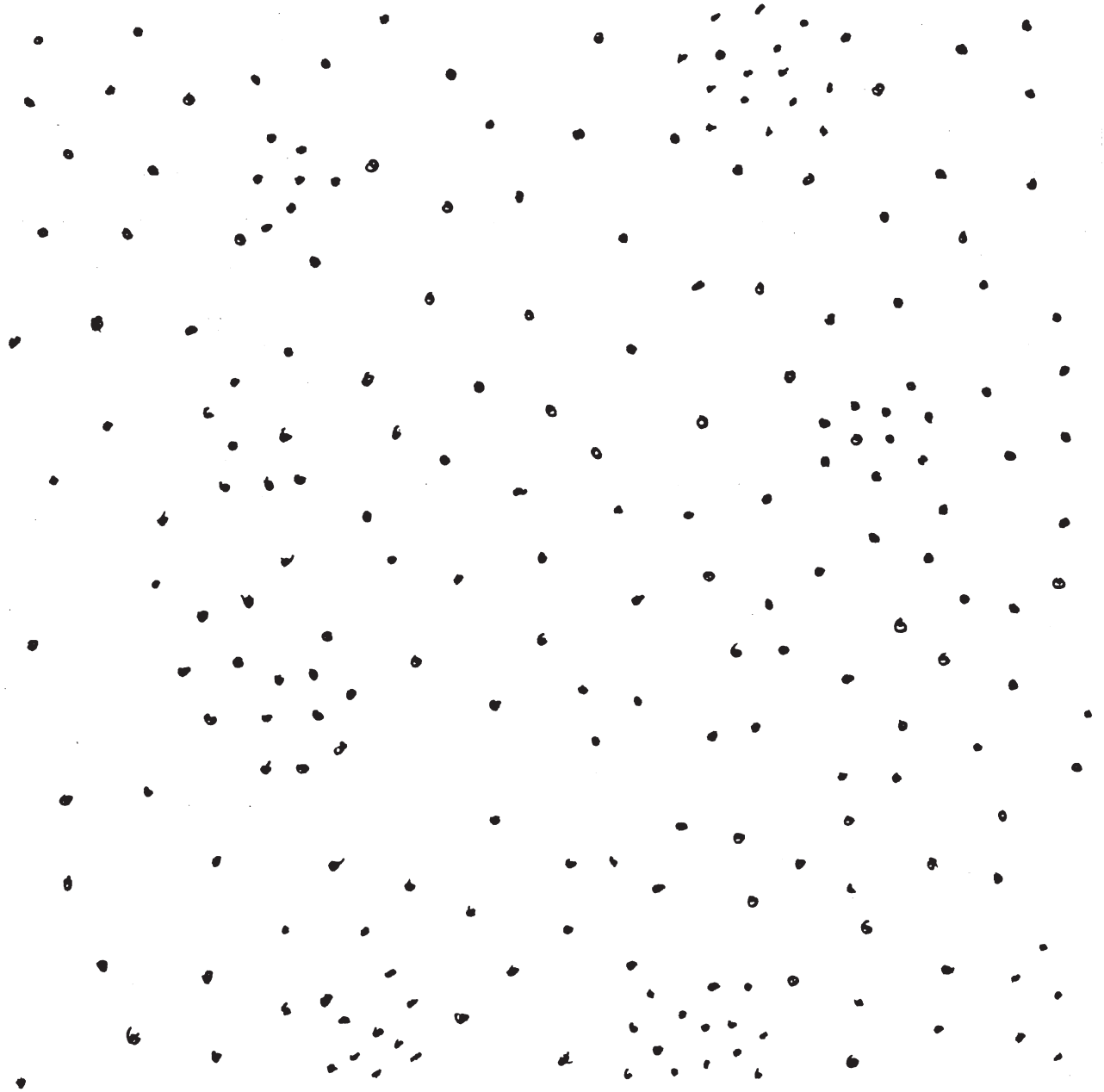
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**WORKSHEET C — POPULATION ESTIMATE BY SAMPLING
(On following page)**

Name:

Date:



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WORKSHEET D — FOREST SAMPLE PLOTS

Name:

Date:

Group:

I. Name of Tree:

II. Number of trees per sample.

Sample	Number of Trees
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Average =

III. Size of forest area =

IV. Number of 10 m squares in forest =

V. Estimated population =
(Number of 10 m squares X Average)