

**TEACHING KATE
TEACHING KIDS ABOUT THE ENVIRONMENT**

**Keys To Trees
Dichotomous Tree Identification**

Grade Level: 9

Time Required: Three-50 minute class periods

SC Science Standards

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

I. B. 10

Also meets these requirements for 7th grade:

I. A. 1 b. 2

I. A. 1 d. 1

Purpose

Students will learn how to identify species of common South Carolina trees using leaf and growth characteristics with the aid of a dichotomous key.

Skills

Application, classification, comparing, contrasting, identification, interaction, interpreting, measuring, observation, organizing.

Concepts

Identification of different species of trees using leaf characteristics, nutrient and environmental requirements vary between tree species.

Materials Needed

Sharpie pens	loose leaf paper
frosted tape	tree tags
newspaper or magazine	small bag of mixed birdseed
samples of various tree leaves found locally	
copies of dichotomous key for “ <u>Tree identification. What tree is this?</u> ”	

Definition of Terms

<u>Alternate leaves</u>	Leaves arranged singly at intervals along the stems.
<u>Apex</u>	The tip or distal end of a leaf.
<u>Aromatic</u>	Being capable of giving off a smell; often a spicy or sweet odor in plants.
<u>Blade</u>	The flat or expanded part of a leaf (lamina).
<u>Bract</u>	A small leaf or leaflike structure beneath a flower or flower cluster.
<u>Bristle</u>	Stiff strong hair.
<u>Bud scale</u>	A small modified leaf on the outside of a bud.
<u>Bud scale scar</u>	The scar left on a twig when a bud scale falls.
<u>Bundle scar</u>	Dotlike scars within a leaf scar, representing the broken ends of ducts which led into the leafstalk.
<u>Chambered pith</u>	Pith is divided into empty compartments by cross partitions.
<u>Compound leaf</u>	A type of leaf that has three or more leaflets attached to a common stalk.
<u>Crenate</u>	A leaf margin that has rounded teeth.
<u>Deciduous trees</u>	Trees that lose all leaves at the end of every season of growth.
<u>Dehiscent</u>	Fruit that has slits or valves by which its outer covering opens.
<u>Dentate</u>	A leaf margin that has pointed teeth that are directed outward.

<u>Doubly serrate</u>	A serrate leaf margin where the primary teeth support another set of teeth.
<u>Entire</u>	A leaf margin that is smooth without teeth or lobes.
<u>Falcate leaves</u>	Leaves that are sickle or scythe-shaped.
<u>Fascicle</u>	A bundle or dense cluster of leaves.
<u>Fruit</u>	The seed-bearing portion of a plant.
<u>Globose</u>	Spherical.
<u>Husk</u>	Outer covering of a nut.
<u>Indehiscent</u>	Fruit that does not open by means of slits or valves in its outer covering.
<u>Internode</u>	The part of a twig between two nodes.
<u>Lateral bud</u>	A bud that is situated along the sides of a branch and not at the tip.
<u>Leaf</u>	A lateral outgrowth from the stem whose primary function is the manufacturing of food.
<u>Leaf margin</u>	The border or edge of a leaf.
<u>Leaf scar</u>	The scar left on a twig when a leaf falls.
<u>Leaflet</u>	An individual blade of a compound leaf.
<u>Lenticel</u>	A corky spot on the bark which originally permitted air to enter the twig.
<u>Lobed</u>	A segmented leaf having pointed or rounded extensions separated by sinuses that do not extend more than halfway to the midrib.
<u>Midrib</u>	The central or main vein of a leaf.
<u>Node</u>	The place on a twig where a leaf is attached.
<u>Opposite leaves</u>	Leaves occur in pairs at the nodes.

<u>Palmate leaf</u>	A leaf with veins or lobes that radiate from a central point.
<u>Parted</u>	A leaf margin where the sinuses extend almost to the midrib.
<u>Pendant</u>	Leaves are hanging or drooping.
<u>Persistent</u>	Remaining attached for long periods of time.
<u>Petiole</u>	Stalk of a leaf.
<u>Pinnate leaves</u>	Arrangement of leaflets attached laterally along the rachis of a compound leaf.
<u>Pith</u>	Central, usually soft, portion of a twig.
<u>Rachis</u>	The midrib of a compound leaf.
<u>Serrate</u>	A leaf margin that has pointed teeth that are directed upward.
<u>Sessile</u>	Without a stalk, “sitting” on the stem.
<u>Sinus</u>	The space or indentation between the lobes of a leaf blade.
<u>Spine</u>	A sharp-pointed, rigid, thornlike structure.
<u>Terminal bud</u>	A bud that is at the tip of a stem or branch.
<u>Truncate</u>	Abruptly cut off.
<u>Undulate</u>	A leaf margin that is wavy.
<u>Whorled leaves</u>	Leaves occurring three or more at a single node.

Before The Meeting

Lesson 1:

Secure enough mixed birdseed for each student to have a hand full. You could allow the students to work in pairs or groups. Place several sheets of paper at each work area.

Lesson 2:

Gather samples of different tree leaves found in your local area, especially those on your school grounds. Make copies of the dichotomous key for each work area. Acquire copies of Tree Identification. What tree is this? (South Carolina Forestry Commission).

Lesson 3:

Make copies of worksheet “Common Trees of South Carolina” collection sheet. Make available tree identification tags with Sharpie pens.

Background Information

The leaves of trees are best used in making late spring, summer, and early fall tree identifications. Bark can also be used as an identifying characteristic but young trees often do not have the distinguishing bark of older specimens. Unlike flowers or fruits, leaves are present on all living trees during over half of the year. In attempting to identify any tree by its leaves care should be taken to procure normal or typical leaves at all times. Do not take the first specimen you find. Look the tree over, and select a branch which has average looking or normal leaves.

The dichotomous key has been designed to use with the booklet, Tree identification. What tree is this?, because of its ease of procurement. Although this booklet only contains 47 of the approximately 225 native species of trees found in South Carolina, it is a starting point for students to learn how to look closely at a small piece of nature. If they can identify a particular species, maybe someday they can place a specific tree in its most desired location.

Using birdseed will allow the students to look for differences in shape, color, size, and type. This should allow students to practice using classification systems to indicate species that are or are not related.

Suggested Lesson Plans

Session 1:

1. Discuss things we use to help us identify items. Talk about methods that include use of all of our senses. Lead the students into thoughts of how to identify plants, animals, and, finally, trees.
2. Give the students a handful of mixed birdseed. Have them sort the seed using any method they wish, such as size, type, color, or any method they can later explain to the class.

3. Have the students write a description of their method of sorting. Have them exchange their “key” with other students to see if they can follow some other students’ methodology to arrive at the same conclusion as the developer of that “key”.
4. Explain to them the structure of a dichotomous key and how the “keys” they developed resemble or differ from one. Ask what items might be used to create a dichotomous key for tree identification. Have the students design a dichotomous key that might be used to identify trees by their leaves.
5. Distribute the “dichotomous key for tree identification” hand-out, and have the students compare it with the key they just developed and list any differences.
6. Have the students find any words listed on the key that they do not know. Hand out copies of leaf shapes and definitions sheets for their work station.

Session 2:

1. Review the leaf characteristics used in session 1. Hand out a copy of Tree identification. What tree is this? to each work station.
2. Ask the students to find examples of each leaf characteristic in the booklet.
3. Take the students outside to an area with several different species of trees.
4. Have the students label the trees with a tree tag. They can label using “A”, “B”, etc.
5. Have the students collect a sample of the leaves from each labeled tree and bring them back to the classroom for classification.
6. Have the students record the characteristics of each specimen. Using the key, have them explain their observations and defend their results to the class.
7. Have each student place the leaf samples between pages of a non-slick magazine.

Session 3:

1. After the leaves have dried, and are pressed, have the students carefully remove them from the magazine and mount them on paper with frosted tape.
2. Have them label each leaf with the tree species and place in their class binder as reference material.

3. Allow the students to repeat this process with leaf samples brought from home and add to the class collection.
4. Have the students, using their identification results, label each tree on school grounds with tree tags with proper scientific and common names.

Application

Students will now be able to identify many of the common trees found in their area. This will provide them the basis to acquire the additional information needed to develop the life skills that will allow them to plant a tree in a place where it is most likely to receive the water, sunlight, and environment for optimum continued growth.

Extension

Have students identify trees during the winter using a twig key.

Resources Available

Tree identification. What tree is this?. South Carolina Forestry Commission, Columbia, SC, 29221.

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

Kessler, G.D., L.J. Boller, Sr. 1995. Teaching Kids About The Environment Lesson Plans. Coalition for Natural Resources Education. 247p.

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. 29634-03 31.

Trees. William Carey Grimm. Stackpole Books, Mechanicsburg, PA 17055

Prepared by: R. Calvert Sherard, Jr.

DICHOTOMOUS KEY FOR WHAT TREE IS THIS?

- | | |
|--|-------------------|
| 1. Trees with needlelike or scalelike leaves (conifers) | 2 |
| 1. Trees with broad flat leaves of many shapes and patterns (broadleaves) | 9 |
| 2. Leaves needlelike | 3 |
| 2. Leaves scalelike, sometimes prickly on young trees | Eastern redcedar |
| 3. Leaves in bundles (fascicles) of 5 or fewer (pines) | 4 |
| 3. Leaves not in bundles or clusters | 8 |
| 4. Leaves in bundles of 2 and 3 | 5 |
| 4. Leaves in bundles of 3 | 6 |
| 5. Leaves short (2-4 inches), cone small (2-3 inches) | Shortleaf pine |
| 5. Leaves long (6-10 inches), cone large (4-6 inches) | Slash pine |
| 6. Leaves medium (5-9 inches) | 7 |
| 6. Leaves very long (10- 14 inches), cone very large (8- 10 inches) | Longleaf pine |
| 7. Cones small (2-3 inches) | Pond pine |
| 7. Cones medium (4-6 inches) | Loblolly pine |
| 8. Leaves flattened, evergreen, white on underside | Eastern hemlock |
| 8. Leaves fern-like, deciduous, green on both sides | Baldcypress |
| 9. Leaves fan-shaped, 2 or more feet across | Cabbage palmetto |
| 9. Leaves otherwise | 10 |
| 10. Leaves opposite or whorled | 11 |
| 10. Leaves alternate | 14 |
| 11. Leaves compound | 12 |
| 11. Leaves simple | 13 |
| 12. Leaflets 3-5, margins with coarse large teeth or shallowly lobed | Boxelder |
| 12. Leaves palmate, 5 shortstalked, large leaflets
4-6 inches long, 2-3 inches wide | Red buckeye |
| 13. Leaves 3-5 lobed, margins doubly serrate | Red maple |
| 13. Leaves unlobed, margins smooth | Flowering dogwood |

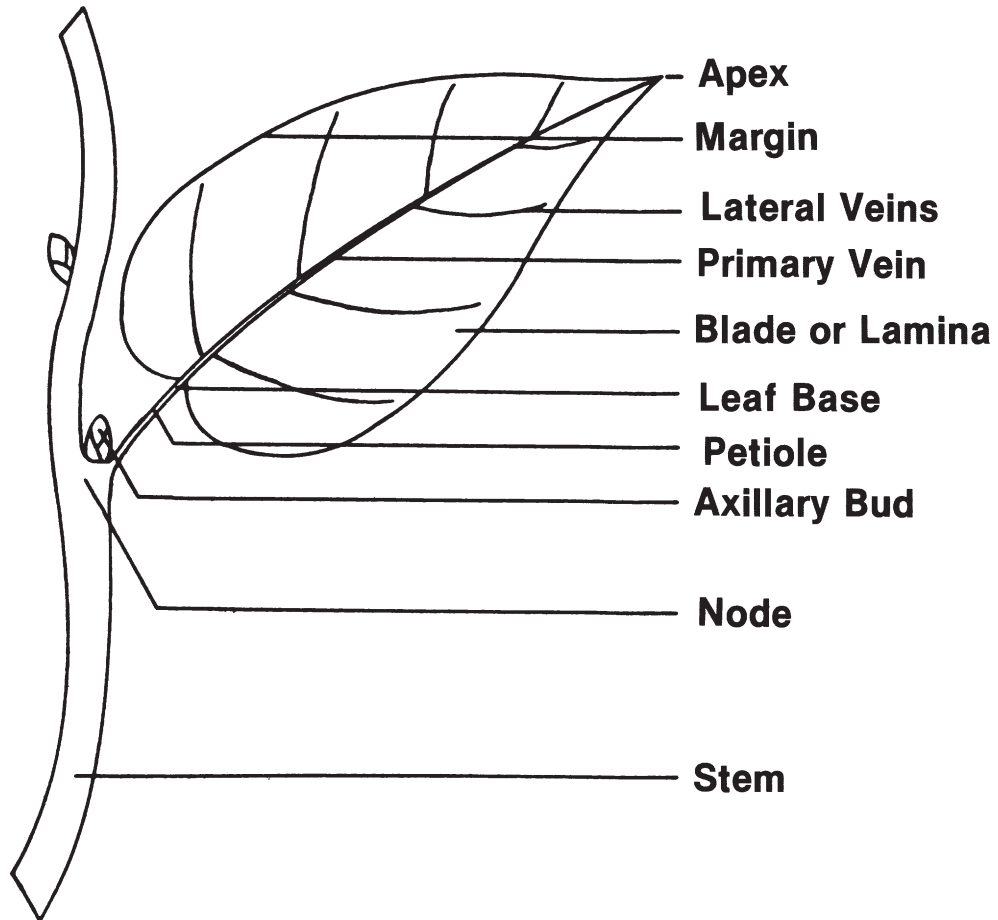
14. Leaves compound	15
14. Leaves simple	18
15. Twigs with thorns, spines, or prickles	Honeylocust
15. Twigs without thorns, spines, or prickles	16
16. Leaflets 9-17, fruits elongate, not sharply winged	Pecan
16. Leaflets 3-9	17
17. Leaflets 5-9, leaflets, petiole, and rachis densely hairy	Mockernut hickory
17. Leaflets 3-7, leaflets, petiole, and rachis smooth or nearly so, bark shaggy, peeling in long strips	Shagbark hickory
18. Leaves evergreen, thick and leathery	19
18. Leaves deciduous, thin and papery	22
19. Leaves with spine-toothed margins	American holly
19. Leaves with smooth margins	20
20. Leaves large, over 6 inches long, with rusty hairs beneath	Southern magnolia
20. Leaves small, 2-5 inches long, without hairs	21
21. Leaves densely white beneath, without lobes	Sweetbay
21. Leaves greenish or slightly white beneath, occasionally with lobes	Live oak
22. Leaves lobed	23
22. Leaves unlobed or with occasional small shallow lobes	33
23. Leaves with 3 shapes (unlobed, lobed, 3-lobed)	24
23. Leaves with one basic shape	25
24. Leaves with smooth margins	Sassafras
24. Leaves with serrate margins	Red mulberry
25. Leaves star-shaped, with 5-7 lobes	Sweetgum
25. Leaves not star-shaped	26
26. Tip and base of leaves truncate, shallowly 4-lobed	Yellow poplar
26. Leaves not truncated	27
27. Leaves with 3 or more main veins, margins with large coarse teeth	American sycamore
27. Leaves with 1 vein, margins deeply lobed (oaks)	28

28. Leaves with smooth, rounded lobes (white oaks)	29
28. Leaves with bristly tipped lobes (red oaks)	30
29. Lobes similar with sinuses halfway to midrib	White oak
29. Three upper lobes square, forming a cross, deep central sinus	Post oak
30. Base of leaves bell-shaped, 3-5 leaflets with long narrow terminal lobe	S. red oak
30. Base of leaves tapering with terminal and lateral lobes equal size	31
31. Base of leaves strongly tapering	Turkey oak
31. Base of leaves rounded or shallowly tapering	32
32. Base of leaves rounded, shallowly 3-lobed, with minute bristles at the tip of the lobes	Blackjack oak
32. Leaves mostly less than 6 inches long, acorn cups shallow and saucer-shaped	Pin oak
33. Leaves with smooth margins (occasionally shallow teeth)	34
33. Leaves with toothed margins	38
34. Leaves heart-shaped	Eastern redbud
34. Leaves not heart-shaped	35
35. Leaves deciduous, but stay on the tree through the winter, less than 4 inches long.	36
35. Leaves 4-6 inches long, without teeth	37
36. Leaves with occasional lobes and teeth, long tapering base	Water oak
36. Leaves with wavy margins, occasionally with teeth, rounded base	Laurel oak
37. Leaves 3 or more times as long as wide,	Willow oak
37. Leaves widest in upper half	Black tupelo
38. Leaves with small teeth above the middle, smooth margins below	Sourwood
38. Leaf margins toothed throughout	39
39. Leaves with parallel veins, each vein ending in a tooth	40
39. Leaves with net veins, not ending in teeth	44
40. Leaf margins with singly serrate teeth	41
40. Leaf margins with doubly serrate teeth	42

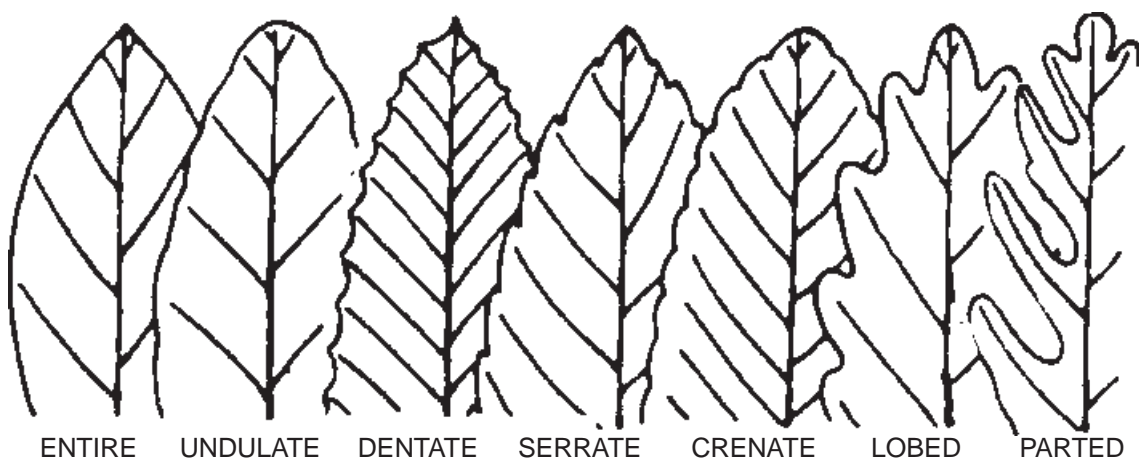
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|--|--------------------|
| 41. Leaves downy beneath with rounded teeth, petioles yellow | Swamp chestnut oak |
| 41. Leaves with sharp points or bristles on the teeth | American beech |
| 42. Leaves 1 to 3 inches long, have bases with unequal sides | Winged elm |
| 42. Leaves with symmetrical bases | 43 |
| 43. Leaf bases broadly wedge-shaped | River birch |
| 43. Leaf bases rounded or tapered | American hornbeam |
| 44. Leaves not more than twice as long as wide, not heart-shaped,
green beneath, midvein distinct, often with rusty hairs beneath | Black cherry |

NOTES: Leyland cypress not included (sterile hybrid)
Wax myrtle and yellow hawthorne mostly considered as large shrubs

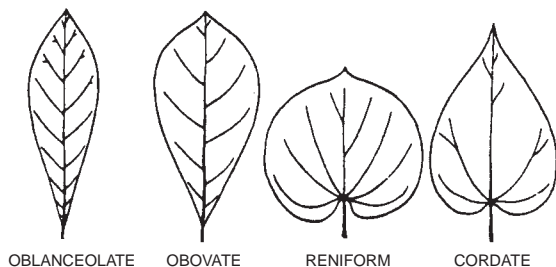
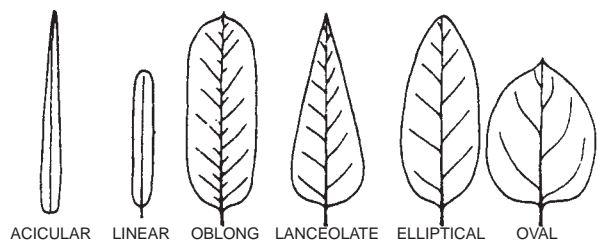
LEAF CHARACTERISTICS



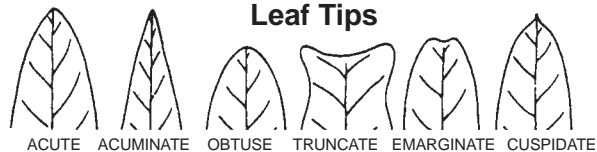
Leaf Margins



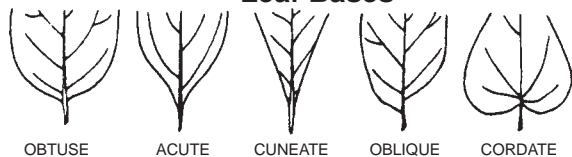
Leaf Forms



Leaf Tips



Leaf Bases



Leaf Arrangement



Leaf Composition

