

**TEACHING KATE
TEACHING KIDS ABOUT THE ENVIRONMENT**

SEE THE FOREST THROUGH THE TREES

Grade Level: 7

**Time Required: 5 class periods of
90 minutes each**

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, 2
- I. A. 1. d. 1
- I. A. 3. a.
- I. A. 4. b.
- I. A. 7. a, b, c
- II. A. 5. a.
- II. B. 1. a.
- II. D. 3. a, b, c

Purpose

Students will identify parts of a tree, calculate percentage of growth, diameter, radius, explain what a forest is and how foresters manage and maintain a forest as a crop.

Skills

Collecting data; critical thinking; division; finding diameter, radius and circumference; graphing; interpreting data; measuring; multiplication; observing; recording data; subtraction; using ratios.

Concepts

Trees have a definite structure. Much can be determined about a tree just with the circumference. Specific characteristics are required in order for a wooded area to be classified as a forest. Trees in a forest are valuable resources to people.

Materials Needed

tree cookies	teaching cookie
metric tapes	graph paper
rulers	markers
string	drawing paper
natural resource professional	<i>The Lorax</i> by Dr. Seuss

Definition of Terms

<u>Acrostic</u>	A type of poem where the first letter of each line, when read vertically spells out a word.
<u>Board Feet</u>	Unit of wood volume that contains 144 cubic inches.
<u>Cambium</u>	Where growth occurs; produces cells so the tree grows.
<u>Canopy</u>	Forest layer formed by the top branches and leaves of trees or shrubs.
<u>Cinquain</u>	Type of poetry consisting of 5 lines. Line 1—title in two syllables, line 2—description of the title in two syllables, line 3—description of action in six syllables, line 4—description of a feeling in 8 syllables and line 5—another word for the title in 2 syllables.
<u>Deforestation</u>	Removal of trees and changing the use of the land, such as converting the land to agricultural fields or pasture land.
<u>Diamante</u>	A poem in the shape of a diamond. Line 1—one noun, line 2—two adjectives, line 3—three participles, line 4—four nouns, line 5—3 participles, line 6—two adjectives and line 7—one noun.
<u>Forest</u>	Has three characteristics 1) has at least 10 trees per acre, 2) has trees that have the potential for growth to 20 feet or taller and 3) the area’s primary purpose is that of being a forest.
<u>Forester</u>	A person who is trained and practices forestry.
<u>Forestry</u>	Principles and practices in managing a forest; primary goal is managing timber, other goals may include managing wildlife, fish, watersheds and recreation.
<u>Free Verse</u>	No formula or style to this type of poetry.

<u>Haiku</u>	A Japanese form of poetry consisting of three lines: 5 syllables, 7 syllables, 5 syllables.
<u>Heartwood</u>	Darker area surrounding the pith; consists of closed up capillaries, the wood in this area is dead.
<u>Inner Bark</u>	The outer cells of the cambium; also helps transport fluids down the tree from leaves to roots.
<u>Outer Bark</u>	Rough exterior of the tree.
<u>Picture Poetry</u>	A poem where the words form a picture of what is happening.
<u>Pith</u>	Center of the rings of a tree, the position of the pith can indicate the growth conditions.
<u>Sapwood</u>	Serves as a transportation system for liquids and nutrients to pass up the tree to outer leaves and branches.
<u>Windspark</u>	A poem with five lines with the following pattern: line 1- begins with “I dreamed,” line 2- “I was...” (something or someone), line 3- where, line 4- an action and line 5- how.

Before the Session

Day 1 - make copies of handout “Parts of a Tree” from the *Teaching KATE* curriculum “Forest Resources” section, have drawing paper at hand and put vocabulary on the chalkboard for student starter.

Day 2 - make copies of “Tree Growth” worksheet. Make copies of “Building a House” worksheet, “Board Feet - Relationship Between the Size of the Tree and the Amount of Lumber It Produces,” handout and “Tree Products” handout from the “Forest Resources” section of the *Teaching KATE* curriculum.

Day 3 - secure copy of *The Lorax* by Dr. Seuss (book or video). Have questions on 3 X 5 cards ready.

Day 4 - contact the local State Forestry Commission office to request a forester to visit and speak to students about a forester’s work and how they manage forests for multiple uses.

Day 5 - have paper available for students final copies of their poetry.

Background Information

Trees are important to us in many ways. We look to trees for beauty, food, oxygen, soil protection, habitat for animals, shade, lumber, fire wood, and other products we use everyday. In one way or another, we come into contact with a product everyday that has been made from a tree. There is even a cloth used for clothing now made out of wood fibers called Tencel.

In many areas of the world trees are removed without any intent of replanting. If a forest is cut and left alone it will still be a forest with a different structure. It will one day become a productive forest again. With replanting and management the stages of development are enhanced. Deforestation is removal of trees and changing the use of the land, such as converting the land to agricultural fields, pasture land or lakes. An example of this is the slash and burn practices in South America.

Suggested Lesson Plan

Day 1

1. Students will define the following words as a starter activity: pith, cambium, sapwood, inner bark, outer bark and heartwood.
2. Go over vocabulary.
3. Use teaching cookie to show students the parts of the tree. Pass out tree cookies and “Parts of a Tree” handout.
4. Let students determine age of trees by counting the annual rings. Next, let the students draw their tree cookies.
5. Have students label the parts of their tree cookie.

Day 2

1. Pass out “Tree Products” worksheet to students.
2. Go over answers with students.
3. Review parts of a tree, review annual rings.
4. Pass out “Tree Growth” worksheet.
5. Measure the annual rings (in cm) for every 10 years in the tree cookies. Plot these measurements on the graph.

6. Find the diameter (distance across in cm.) and divide by 2. This answer is the radius. Now divide each 10 year measured section (in cm.) by the total radius. This answer is the percentage of growth.
7. Plot the percentages on the other graph.
8. Have the students record circumference (distance around), diameter and radius in the table on the “Tree Growth” worksheet. Have students exchange tree cookies several times measuring the circumference and diameter and calculating the radius of each. Have students calculate the numerical constant which results from dividing circumference by diameter (pi). See if students recognize this constant and know what it is called. This information should be recorded in the columns provided on the table.
9. Take students to a wooded area. Let them choose a tree.
10. Pass out the “Board Feet - Relationship Between Size of the Tree and the Amount of Lumber It Produces” handout and the “Building a House” worksheet. Have students determine the circumference of their trees. Instruct them to do this with a string, measuring the circumference at breast height (4.5 feet), and then measuring the string.
11. Next, instruct students to divide the circumference by 3.14. This equals the diameter. Use the chart on “Board Feet” handout to determine how many logs per tree and board feet per tree.

Extra Credit

Let students figure out how many trees would be required to build a house of approximately 17,000 board feet. Use “Board Feet” handout to figure the number of logs, divide the number of board feet from your tree into 17,000.

Day 3

1. Starter: Have the students discuss the question “How can a forest be renewable?” Explain what a forester’s job might entail.
2. Read the story or show the video *The Lorax* by Dr. Seuss.
3. Divide students into groups and give them a card with a question from the story on it. (Check *Project Learning Tree* book, activity 89, for ideas for questions.)
4. Have groups discuss and answer their question. Groups will then present their questions and answers to the class.

Day 4

1. Starter: Have students make a list of ways they use or benefit from the forest. Discuss.
2. Introduce the guest speaker from the S.C. Forestry Commission.

Enrichment

Mystery dramas- Students will divide into groups of 4 and put on a silent skit that depicts a particular way that someone can use the forest.

Day 5

1. Discuss different types of poetry. The teacher will model each type. See activity 5 in the *Project Learning Tree* book for additional examples to those given in Definition of Terms section.
2. Encourage students to choose a type of poetry and to create their own poem.
3. Give students an opportunity to illustrate their poetry and to share with the class.
4. Assemble students' poetry into a class book.

Application

Tree farmers grow trees for profit just like any other farmer except harvest is on a long rotation. Whether forests are farmed or natural, growth is maximized when the site is managed. This is the job of a forester. A forester can spot trouble spots caused by disease or insects, estimate the amount of merchantable timber present, advise land owners when to harvest, advise timber owners on management practices to optimize goals- whether it is grow the timber as fast as possible or manage for certain wildlife species, etc. In 1995, foresters were kept very busy due to an outbreak of Pine Beetles. Pine Beetles kill pine trees. Those which are not killed have a reduced value due to the damage from the beetles. They could also die later after fighting off the infestation because of a disease that is introduced due to the beetle damage. Stress on trees due to crowding or weather conditions cause higher susceptibility to death by the beetle. Foresters must be able to identify and follow such outbreaks and advise landowners on how best to control the outbreak.

Extension

Have the students research in groups pests and diseases that affect trees (Chestnut blight, etc.). The students should present their findings to the class.

Resources Available

Brad Bramlett, Forester. South Carolina Forestry Commission, Orangeburg, S.C.

Our Wonderful World. 1987. AIMS Education Foundation, PO Box 8120, Fresno, CA 93747.

Project Learning Tree. 1994. American Forest Foundation, 1111 19th St. NW, Washington, D.C. 20036.

Teaching KATE. 1995. G. D. Kessler and L. J. Boller, Sr. Coalition for Natural Resource Education.

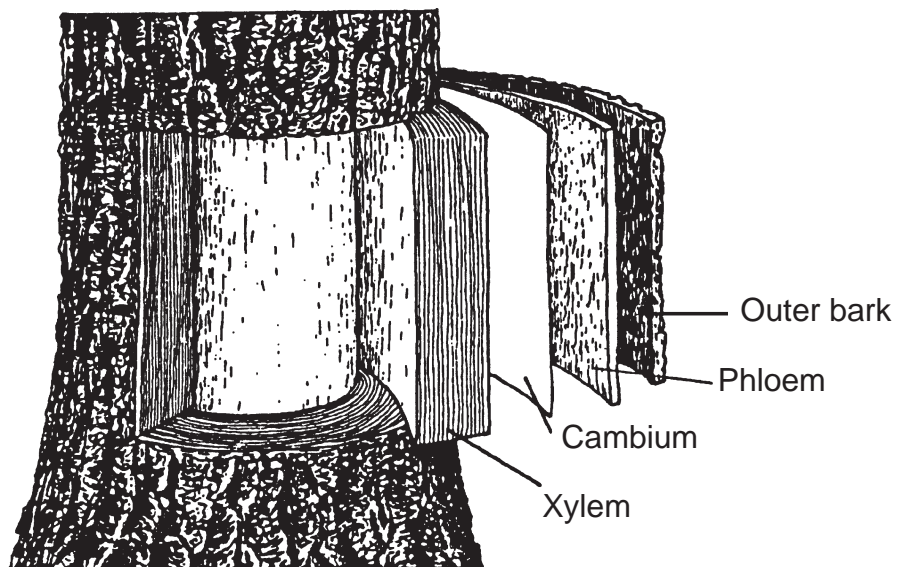
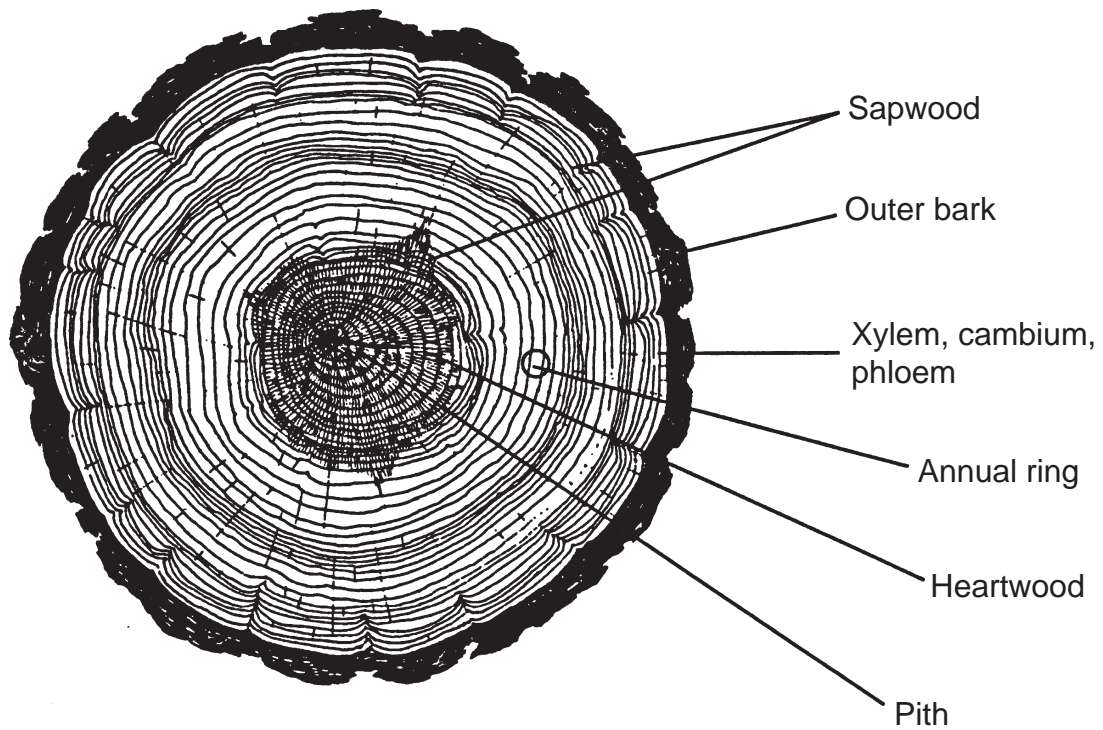
The Lorax. 1971. Dr. Seuss. Random House, N.Y.

Prepared by: Wendy Bramlett

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PARTS OF A TREE



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TREE PRODUCTS

Name:

Circle the 10 items in the following list that are not made using trees.

Acetate	Cotton shirt	Hair spray	Photographic film	Suede jacket
Alcohol	Croquet mallets	Hammers	Piano keys	Telephone books
Allen wrench	Crutches	Hardboard	Picture frames	Telephone poles
Ammunition	Cutting boards	Incense	Pipes	Tent poles
Arrows	Decoys	Insecticides	Plywood	Tires
Artificial snow	Diamond rings	Jewelry	Postage stamps	Toboggans
Axe handles	Diapers	Kites	Postcards	Toilet seats
Barrels	Dominoes	Knife handles	Pottery	Toilet paper
Baseball bats	Doors	Leather shoes	Poultry feed	Toothpicks
Bird houses	Egg cartons	Linoleum	Power poles	Trombones
Boats	Facial Tissue	Liquid soap	Printing ink	Turpentine
Bowling pins	Fence posts	Maple syrup	Railroad ties	Varnish
Broom handles	Fertilizer	Masking tape	Rakes	Vinegar
Buttons	Fingernail Polish	Matches	Rayon	Violins
Canes	Fish feed	Medicine	Riot sticks	Wallets
Canoes	Fishing floats	Milk cartons	Rolling pins	Yardsticks
Cardboard	Fishing line	Mirrors	Sausage casings	Yeast
Caskets	Flooring	Mousetraps	Sawhorses	
Ceiling tile	Flypaper	Movies	School desks	
Charcoal	Fruits and nuts	Napkins	Seesaws	
Christmas trees	Fuel	Newspaper	Shade	
Cider	Garment bags	Oars	Shelf paper	
Coffee filters	Glasses frames	Oxygen	Shovel handles	
Computer paper	Golf tees	Paddles	Silverware	
Concrete forms	Grocery bags	Paint	Skis	
Corks	Guitars	Particleboard	Sleds	
Cosmetics	Gum	Paper plates	Snowshoes	
Counter tops	Gun stocks	Pencils	Stationary	

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TREE PRODUCTS - TEACHER'S KEY

Circle the 10 items in the following list that are not made using trees.

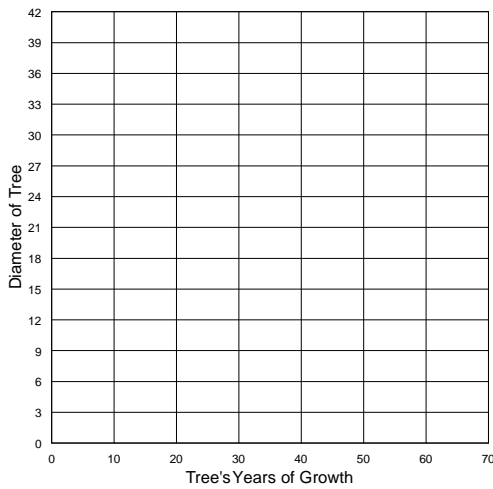
Acetate	<u>Cotton shirt</u>	Hair spray	Photographic film	<u>Suede jacket</u>
Alcohol	Croquet mallets	Hammers	Piano keys	Telephone books
<u>Allen wrench</u>	Crutches	Hardboard	Picture frames	Telephone poles
Ammunition	Cutting boards	Incense	Pipes	Tent poles
Arrows	Decoys	Insecticides	Plywood	Tires
Artificial snow	Diamond ring	Jewelry	Postage stamps	Toboggans
Axe handles	Diapers	Kites	Postcards	Toilet seats
Barrels	Dominoes	Knife handles	<u>Pottery</u>	Toilet paper
Baseball bats	Doors	<u>Leather shoes</u>	Poultry feed	Toothpicks
Bird houses	Egg cartons	Linoleum	Power poles	<u>Trombones</u>
Boats	Facial Tissue	Liquid soap	Printing ink	Turpentine
Bowling pins	Fence posts	Maple syrup	Railroad ties	Varnish
Broom handles	Fertilizer	Masking tape	Rakes	Vinegar
Buttons	Fingernail Polish	Matches	Rayon	Violins
Canes	Fish feed	Medicine	Riot sticks	<u>Wallets</u>
Canoes	Fishing floats	Milk cartons	Rolling pins	Yardsticks
Cardboard	<u>Fishing line</u>	<u>Mirrors</u>	Sausage casings	Yeast
Caskets	Flooring	Mousetraps	Sawhorses	
Ceiling tile	Flypaper	Movies	School desks	
Charcoal	Fruits and nuts	Napkins	Seesaws	
Christmas trees	Fuel	Newspaper	Shade	
Cider	Garment bags	Oars	Shelf paper	
Coffee filters	Glasses frames	Oxygen	Shovel handles	
Computer paper	Golf tees	Paddles	<u>Silverware</u>	
Concrete forms	Grocery bags	Paint	Skis	
Corks	Guitars	Particleboard	Sleds	
Cosmetics	Gum	Paper plates	Snowshoes	
Counter tops	Gun stocks	Pencils	Stationery	

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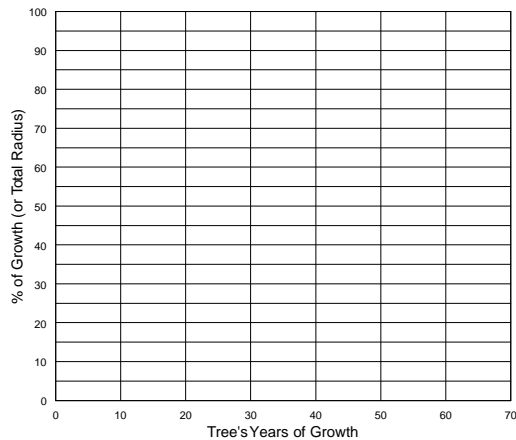
TREE GROWTH

Name: _____



Measure Tree Rings By Decades

- 10 yrs. _____ cm ÷ radius = _____ % of growth
- 20 yrs. _____ cm ÷ radius = _____ % of growth
- 30 yrs. _____ cm ÷ radius = _____ % of growth
- 40 yrs. _____ cm ÷ radius = _____ % of growth
- 50 yrs. _____ cm ÷ radius = _____ % of growth
- 60 yrs. _____ cm ÷ radius = _____ % of growth
- 70 yrs. _____ cm ÷ radius = _____ % of growth



	Circumference C	Diameter D	Radius R	C ÷ D
Tree 1				
Tree 2				
Tree 3				
Tree 4				
Tree 5				

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BOARD FEET

**RELATIONSHIP BETWEEN THE SIZE OF THE TREE
AND THE AMOUNT OF LUMBER IT PRODUCES**

Name:

Tree Diameter	Number of Merchantable Logs per Tree ¹	Amount of Lumber (Board feet) ² per Tree ³
10"	2	42
12"	2	75
14"	3	146
16"	3	211
18"	4	331
20"	4	432
22"	4	549
24"	4	665
26"	5	945
28"	5	1120
30"	5	1325

¹A log is 16 feet long.

²A board foot is 12" x 12" x 1" or 144 cubic inches of wood.

³Extracted from Scribner volume tables.

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BOARD FEET - TEACHER'S KEY

**RELATIONSHIP BETWEEN THE SIZE OF THE TREE
 AND THE AMOUNT OF LUMBER IT PRODUCES**

Number of Tree Diameter	Amount of Lumber Merchantable Logs per Tree ¹	Number of Trees (Board feet) ² per Tree ³	To Build One House ⁴
10"	2	42	405
12"	2	75	227
14"	3	146	117
16"	3	211	81
18"	4	331	52
20"	4	432	40
22"	4	549	31
24"	4	665	26
26"	5	945	18
28"	5	1120	16
30"	5	1325	13

¹A log is 16 feet long.

²A board foot is 12" x 12" x 1" or 144 cubic inches of wood.

³Extracted from Scribner volume tables.

⁴Average of 17,000 board feet of lumber required per house.

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BUILDING A HOUSE

Name:

<u>Tree Number</u>	<u>Circumference</u>	<u>Diameter</u>	<u>Board Feet</u>
--------------------	----------------------	-----------------	-------------------

1

2

3

4

5

Diameter = Circumference / Pi

Pi is a constant and is 3.14

How many trees will be required to build an average-size house? An average house requires 17,000 board feet of wood.