Where's MY Tree?

In the United States, every person uses about 74 cubic feet of wood each year. This wood becomes newspapers, books, toilet paper, fences, pencils, furniture, plywood, fuelwood, and all the other timber products we consume. (Source: USDA Forest Products Laboratory General Technical Report - *U.S. Timber Production, Trade, Consumption, and Price Statistics, 1965 - 1997*)

A *cubic foot* is a piece of lumber measuring 12" X 12" X 12". Multiply that size of board by 74 and you've got a big stack of wood! Maybe you can imagine how big that stack would be, but can you imagine the size of the tree that it came from? After learning how to measure trees, your students will be challenged to find trees big enough to supply them with wood and wood products for one year.

Getting Ready

1. Gather the materials needed.

2. Make one copy of the **Volume in Cubic Feet** chart on page 71 for each group of 2 - 3 students.

3. Locate a safe place where you can conduct the activity. An ideal spot would have about 10 trees that are 20" or more in diameter.

Doing the Activity

Part A
In the Classroom

Talk through the measurement process with your students. Explain that to calculate how many cubic feet a tree has, we must know the diameter and the height of the tree.

Part B
In the Field

In a large group, show how to use the measurement tools. Choose one tree to measure together.

Find the Diameter

1. Using a tape measure, mark a spot on the trunk that is 4' 6" above the ground.

2. Measure the circumference (distance around the trunk) in inches at this height.

3. Use this formula to find the diameter in inches:

$$\text{diameter} = \frac{\text{circumference}}{3.14}$$

Method

Students use common measuring tools to find trees large enough to supply them with wood and paper for one year.

Key Concepts

Every consumer is responsible for the ways forests are used.

As populations expand, the demand for paper, lumber, and other forest products results in increasing pressure to harvest trees.

Because forests are renewable and most forest products are recyclable, their use is critical to sustainable development.

Objectives

- measure trees using tape measures and rulers

- calculate the number of cubic feet in a tree

- find a tree or trees that contain about 74 cubic feet
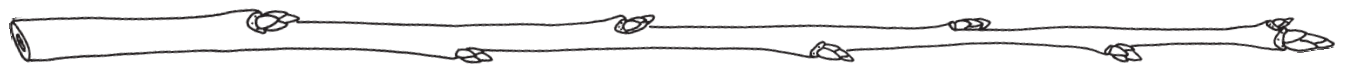
Science:
A.4, C.4, G.4
C.8

Math:
A.4, B.4, C.4, D.4
A.8, B.8, C.8, D.8

English/Language Arts:
B.4, C.4
B.8, C.8

Environmental Education:
A.4, B.4
A.8, B.8

Materials

For each group of 2 - 3 students, you will need:
- tape measure or string
- 12" ruler
- Volume in Cubic Feet chart
- paper and pencil
- clipboard

Preparation Time

10 - 20 minutes

Activity Time

Part A: 10 minutes

Part B: 1 50-minute class period plus travel time

Setting

park, school forest, or school grounds where mature trees are present

Note: If you do not have access to tape measures, you can wrap a string around the trunk. Then measure the length of string with a ruler to find the circumference.
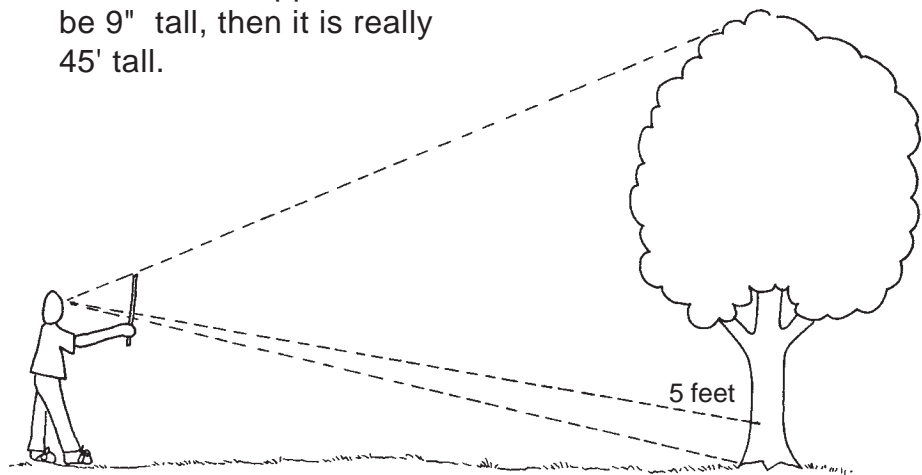
Find the Height

1. Use the tape measure or ruler to measure 5' up the tree trunk. Mark this spot or ask a friend to hold something on the spot.

2. Back away from the tree, holding the ruler at arm's length. Keep backing until, in perspective, 1" on the ruler covers the distance from the ground to the mark.

3. Without moving the ruler, measure the height of the tree in inches. Each inch on your ruler represents 5'. If the tree appears to be 9" tall, then it is really 45' tall.

Calculate the Number of Cubic Feet

Now you can figure out how many cubic feet are in your tree! Use the **Volume in Cubic Feet** chart. For example, a 16" diameter tree that is 70' tall would contain 41 cubic feet.

Find Your Tree!

Now that your students know how to measure a tree and to calculate the number of cubic feet, challenge them to find THEIR tree containing about 74 cubic feet. Look at the chart. Show them how they could find an 18" tree that is 100' tall or a 23" diameter tree that is just over 60' tall to equal about 74 cubic feet. Good luck! Note: If you are in a young forest, your students might have to find two trees that add up to about 74 cubic feet.

5 feet

Assessing Student Understanding

Observe student participation in the activity. Review their measurements, calculations, and conclusions. Assess their ability to grasp the measuring process.

# Extending the Learning

Go Figure!

If each person in America uses one mature tree in a year, and there are 240 million Americans, why haven't we run out of trees? Discuss why trees are so important to sustainable development. Be sure the concepts of renewable and recyclable resources enter your discussion.

Think Globally

If all the trees in the forest you visited were cut down, how many Americans would have enough wood and paper products for one year? How many Europeans? How many Africans? Americans are huge consumers. Challenge students to find out how our use of resources compares with other peoples around the globe. Check out the book *Material World: A Global Family Portrait* by Peter Menzel.

Rethink Ownership

Read *Once There Was a Tree* by Natalia Romanova. This story from Russia tells of a tree stump and the animals that call it home. It beautifully says that the tree belongs to all because it grows from the earth that is home for all. What does this mean about how we use forest resources? *Reading Rainbow* featured this book. The videotape is probably available through your local library.
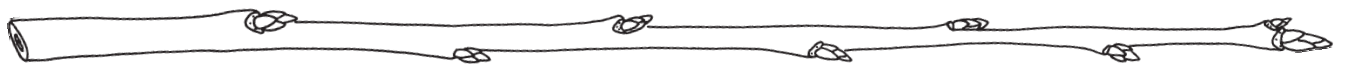

12"
12"
12"
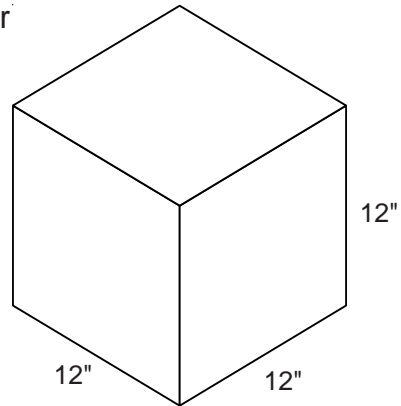
One cubic foot

One cubic foot is a piece of lumber 12" X 12" X 12"
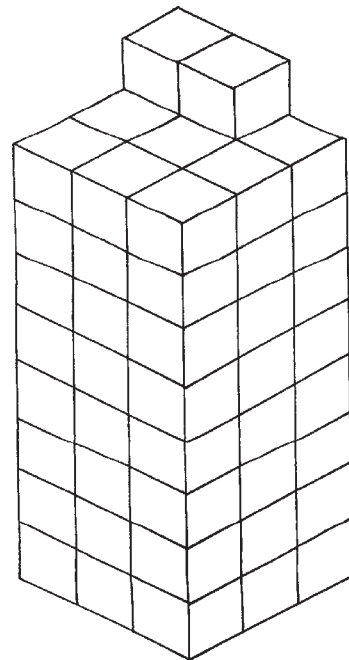
74 cubic feet

The average American uses 74 cubic feet of lumber each year. That's a pile of wood about 3' X 3' X 8'

Find a Champion

Wisconsin keeps records of the largest trees in the state for each species. Finding a state champion tree is rare, but you and your students might have a great time finding the local champs in your own community or school forest. Measuring trees is a good hands-on math activity, and you can practice some of the measuring skills you learned in this lesson. The booklet **Wisconsin's Champion Trees** contains information on how to measure a tree and compare it to the state records. It also includes a detailed listing of the largest trees in the state organized by species. You can get a copy by contacting your local Wisconsin Department of Natural Resources Forester and asking for publication number PUB-FR-115 98. Or find it online (www.dnr.state.wi.us/org/land/forestry/UF/champion/). You can also find directions for measuring trees in the following activities: "Tree Champs" in **NatureScope: Trees are Terrific!**, and "How Big is Your Tree?" in **Project Learning Tree**.
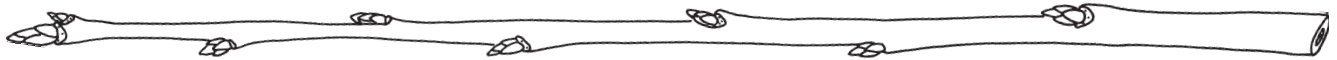
Volume in Cubic Feet

Diameter in inches at 4' 6"	Stem volume (in cubic feet) when total height is:								
	20 feet	30 feet	40 feet	50 feet	60 feet	70 feet	80 feet	90 feet	100 feet
3	0.5	0.6	0.8	1					
4	0.8	1.1	1.5	1.8	2.2				
5	1.3	1.7	2.3	2.9	3.4	4			
6	1.9	2.5	3.3	4.1	4.9	5.8			
7	2.6	3.4	4.5	5.6	6.7	7.8	9		
8		4.4	5.9	7.3	8.8	10.3	11.7	13.2	
9		5.6	7.4	9.3	11.1	13	14.9	16.7	18.6
10		6.9	9.2	11.4	13.7	16	18.3	20.6	22.9
11			11.1	13.9	16.6	19.4	22.2	24.9	27.7
12			13.2	16.5	19.8	23.1	26.4	29.7	33
13			15.5	19.4	23.2	27.1	31	34.9	38.7
14			18	22.4	26.9	31.4	35.9	40.4	44.9
15			20.6	25.8	30.9	36.1	41.2	46.4	51.5
16			23.5	29.3	35.2	41	46.9	52.8	58.6
17			26.5	33.1	39.7	46.3	53	59.6	66.2
18			29.7	37.1	44.5	51.9	59.4	66.8	74.2
19			33.1	41.3	49.6	57.9	66.2	74.4	82.7
20			36.7	45.8	55	64.2	73.3	82.5	91.6
21				50.5	60.6	70.7	80.8	90.9	101
22				55.4	66.5	77.6	88.7	99.8	111
23				60.6	72.7	84.8	96.9	109	121
24				66	79.2	92.4	106	119	132
25				71.6	85.9	100	115	129	143
26				77.5	93	108	124	139	155
27				83.6	100	117	134	150	167
28				89.9	108	126	144	162	180
29				96.4	116	135	154	174	193
30				103	124	144	165	186	206