

Step 4: Total Plot Volume Per Acre

At the contest, team members will give one number as their final answer. This number represents the total plot volume per acre. On the score sheet it will say what part of an acre that one plot represents, it is usually 1/4 of an acre.

To find the answer, contestants must add up tree volume in board feet for all five trees and then divide the volume total by the acre sample plot. So, if you were told that the plot represents 1/4 acre you would divide your volume total by .25 to get the answer. The following is similar to the score sheet that contestants will use at the contest:

Tree Number	DBH (inches)	Merch. Height (# 16' logs)	Volume (board feet)
1			
2			
3			
4			
5			

Total Plot Volume: _____ (1 Plot = 1/4 Acre)
 Total Volume Per Acre: _____ *Circle Your Answer

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1			
2			
3			
4			
5			

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 Total Volume Per Acre: _____ *Circle Your Answer

TREE IDENTIFICATION

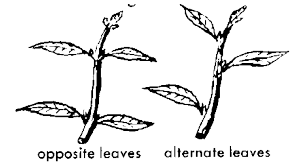
In the Tree Identification Event, 4-H'ers must identify approximately 10-25 trees. Junior have a list of 44 trees that they will learn. Seniors are responsible for an additional 30 trees. At the contest, samples could include full trees, freshly cut foliage, older foliage, pressed foliage, or photographs of foliage. 4-H'ers are typically NOT allowed to touch the trees at the contest.

4-H'ers need only identify the tree by the common name, they are not required to learn the scientific name of the species. On the scorecard, SPELLING COUNTS!! If a 4-H'er clearly identifies the tree correctly, but spells it wrong, they only receive half credit. Incomplete names will be counted wrong. For example Hickory, instead of Mockernut Hickory, would receive no credit.

The following are some tips when teaching tree identification:

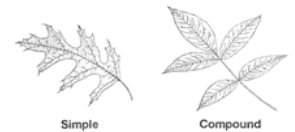
- 1) Learn the shapes of the leaves and what makes each tree sample unique.

- 2) Leaves are often opposite or alternate, depending on where they fall on the stem.



- 3) Leaves can also be divided into Simple and Compound.

- a) Simple: one main leaf blade on a stem (examples- Oaks, Maples, Sycamore, Sweet Gum)
- b) Compound: more than one leaflet on a stem, the whole making up the leaf. (examples- Pecan, Hickories, Black Locust, Buckeye, Black Walnut)



- 4) Needles (such as on pine trees) often grow in clusters or from one place on the twig. Counting the number of needles in cluster and how long they are helps to identify the sample (example: Loblolly Pine needles are 6-9" long and have 3 needles per cluster).

- 5) Trees can also be classified into groups that lose their leaves:
 - a) Deciduous: lose leaves in the fall (examples- Maples, Oaks, Hickories)
 - b) Evergreen: stay green year-long (examples- Pines, Cedars, Hollies)

Diameter Practice Table

	DBH 1	DBH 2	DBH 3	DBH
Tree 1				
Tree 2				
Tree 3				
Tree 4				
Tree 5				
Tree 6				
Tree 7				
Tree 8				
Tree 9				
Tree 10				

Step 2: Merchantable Height

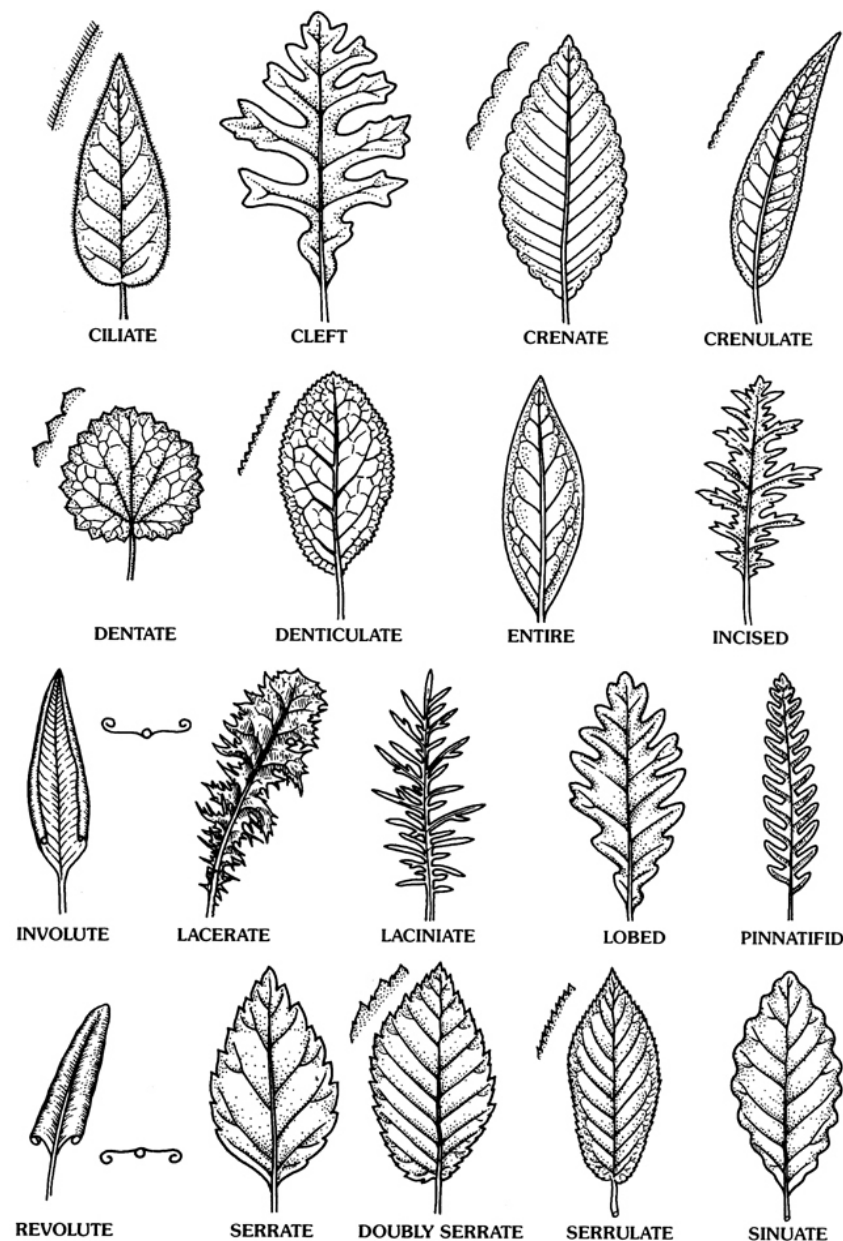
Now that diameter of the tree has been found the, the next step is to determine the height of the tree. Actually, what needs to be found is the height as it relates to the usable amount of timber in 16-foot logs. This is known as Merchantable Height Tree. The height is also found by using the Cruise Stick.

A 4-H'er should step off 66 feet from the tree to find the height. Next they hold the Cruise Stick 25 inches from them and vertical with the tree. They should imagine that the bottom of the stick meets the bottom of the tree. They then simply read up the Cruise Stick where it says how many board feet the tree is. However, trees are not measured all the way to the top. Measurements stop when a team members finds: an eight inch top in diameter (the top of the tree is eight inches or smaller) OR when there is a major fork in the tree.

Board feet should be read to the nearest full or one-half log. Do not make a long longer than is actually is. For example a log that is read as 2 3/4 should be recorded as 2 1/2, not as 3.

The same process (Steps 1 & 2) should be repeated for every tree in the contest. Record the tree diameter and board feet for each tree.

PLATE 4. LEAF MARGINS



as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region*. 4th ed. Indianapolis: Indiana Academy of Science.

Pacing Score Card		
Station	Number of steps	Distance in Feet
A to B		
B to C		
C to D		
Total		

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C to D		
Total		

Multiple Number of Steps x Magic Number for Distance in Feet

TREE SCAVENGER HUNT

Black Cherry *Prunus serotina*

Leaves are alternate, 2 to 5 inches long, oval to oblong and lance-shaped. Margins are finely serrated, dark green and lustrous on top and paler below; usually with a dense yellowish-brown.



Black Gum *Nyssa sylvatica*

Leaves are alternate, simple and 3 to 5 inches long. They are thick, dark green and shiny on top and pale and slightly hairy below, especially in the midrib.

Eastern Redcedar *Juniperus virginiana*

Leaves are evergreen, with two types of leaves, often on the same tree. Scale leaves 1/16 inch long, dark green, with 4 sides. Spreading leaves are more common on young trees, 1/8 to 3/8 inch long, dark blue-green and sharp-pointed.

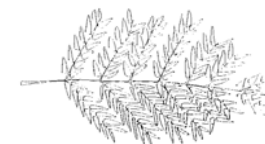


Flowering Dogwood *Cornus florida*

Leaves are opposite, simple, 3 to 6 inches long and oval in shape and pointed on the end. They are thick, bright green and hairy on the upper surface, whitish and hairy below.

Mimosa *Albizia julibrissin*

Leaves alternate, bipinnately compound and up to 20 inches long with 10 to 25 pinnae, each with 40 to 60 leaflets. Leaflets are oblong, 1/4 to 1/2 inches in length.



Mockernut Hickory

Carya tomentosa

Leaves are alternate, compound, with 7 to 9 serrated leaflets. The terminal leaflet is larger than the laterals. The leaf is usually 9 to 14 inches long. Leaves are dark yellow-green and shiny on top, and pale yellow-green to orange-brown and hairy below. The stem is also hairy.



PACING

In the pacing event at the Forestry Field Day contest, Juniors must be able to calculate distance in feet by walking. They are given a pacing course where they walk from flag to flag. The total distance is estimated and one number is turned in for the final score. Generally, the course is set up with four flags labeled: A, B, C & D. They walk the distance from A to B, B to C and finally C to D.

The tricky part of this event is to be consistent when you pace. Each team member will need to figure out their step factor. This is done by calculating how many steps it takes them to walk 100 feet. By doing this, they can figure out how many feet any distance is by simply walking it off and applying their personal step factor.

Step factor should be determined at each practice. It is critical that you learn to walk exactly the same way each time, and this takes training. Also, you should wear the same shoes you plan on wearing to the competition during each practice (boots or tennis shoes work best).

Determining Step Factor:

You should step off the 100ft area 5 times and record how many steps it takes you on each trip. Find the average number of steps, then divide 100 by the average number of steps. This number is your step factor.

Use the following Chart to determine your step factor:

Trip # 1	
Trip # 2	
Trip # 3	
Trip # 4	
Trip # 5	
Total (add all 5 trips)	
Average # of steps (divide total by 5)	
Number of feet per step (divide 100 by avg. # of steps)	

My Step Factor is: _____

(multiply steps by this # to determine the number of feet)

THE FICTIONAL AND INCOMPLETE KEY OF GEORGIA TREES

I. **Evergreen (Needled - Leaf) Trees**

A. **Cedar Family**

1. Atlantic White Cedar - needles in a flat plane
2. Deodar Cedar - looks more like a pine than a cedar
3. Eastern Red Cedar - needles spread out (red spreads)

B. **Pine Family**

1. Long Needled Pines - needles 10 inches or longer
 - a. Longleaf Pine - large terminal buds
2. Medium Needled Pines - needles 6 - 9 inches long
 - a. Loblolly Pine - 3 needles per cluster/sheath (sticky pine cone)
 - b. Slash Pine - 3, sometimes 2 needles to a cluster/sheath
3. Short Needled Pines - needles 1 - 5 inches long
 - a. Eastern White Pine - 5 needles to a cluster (5 letters in white)
 - b. Pitch Pine - 3 needles to a cluster (small loblolly)
 - c. Shortleaf Pine - 2 and 3 needles to a cluster (small slash)
 - d. Virginia Pine - 2 needles to a cluster ("V" for Virginia)

C. **Other Needled Evergreens**

1. Bald Cypress - feather like leaves (Bald Eagle)
2. Eastern Hemlock - needles ½ - 1 inch long, two white strips on back

II. **Deciduous Trees**

A. **Black Cherry Complex**

1. Black Cherry - leaves 2-5 inches long and serrated
2. Black Gum - leaves 3-5 inches long and non-serrated (born on pedestals)

ADOPT-A-TREE

1. Draw a picture of a leaf of your tree.

2. How does the leaf smell?

3. How does the leaf feel?

4. What makes the leaf of your tree special?

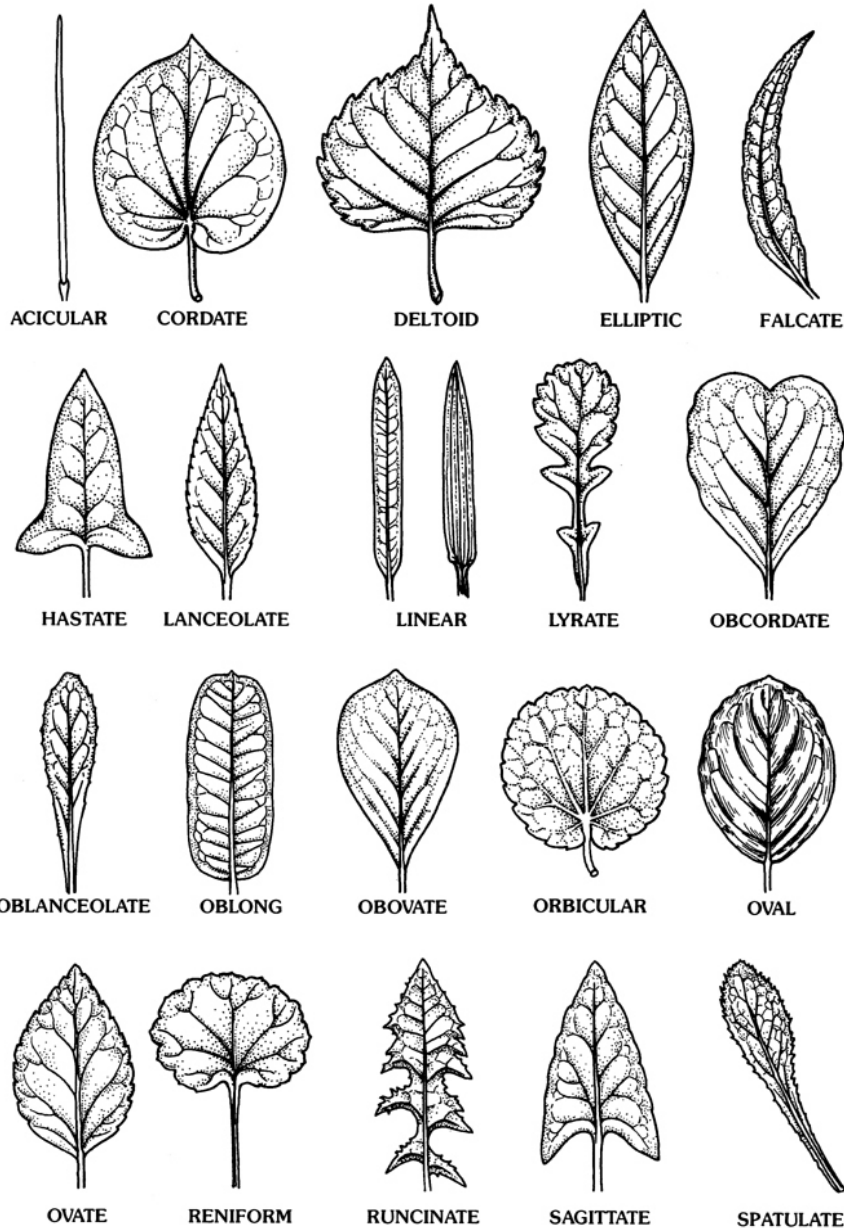
5. How does the bark of your tree feel?

6. How does the bark smell?

7. What else makes your tree different?

Tree Volume in Board Feet (International ¹ / ₄) Number of Usable 16-foot Logs									
DBH	1	1½	2	2½	3	3½	4	4½	5
10	36	48	59	66	73	-----	----	----	----
11	46	61	76	86	96	----	----	----	----
12	56	74	92	106	120	128	137	----	----
13	67	90	112	130	147	158	168	----	----
14	78	105	132	153	174	187	200	----	----
15	92	124	156	182	208	225	242	----	----
16	106	143	180	210	241	263	285	----	----
17	121	164	206	242	278	304	330	----	----
18	136	184	233	274	314	344	374	----	----
19	154	209	264	311	358	392	427	----	----
20	171	234	296	348	401	440	480	511	542
21	191	262	332	391	450	496	542	579	616
22	211	290	368	434	500	552	603	647	691
23	231	318	404	478	552	608	663	714	766
24	251	346	441	523	605	664	723	782	840
25	275	380	484	574	665	732	800	865	930
26	299	414	528	626	725	801	877	949	1021
7	323	448	572	680	788	870	952	1032	1111
28	347	482	616	733	850	938	1027	1114	1201
29	375	521	667	794	920	1016	1112	1210	1308
30	403	560	718	854	991	1094	1198	1306	1415
31	432	602	772	921	1070	1184	1299	1412	1526
32	462	644	826	988	1149	1274	1400	1518	1637
33	492	686	880	1053	1226	1360	1495	1622	1750
34	521	728	934	1119	1304	1447	1590	1727	1864
35	555	776	998	1196	1394	1548	1702	1851	2000
36	589	826	1063	1274	1485	1650	1814	1974	2135
37	622	873	1124	1351	1578	1752	1926	2099	2272
38	656	921	1186	1428	1670	1854	2038	2224	2410
39	694	976	1258	1514	1769	1968	2166	2359	2552
40	731	1030	1329	1598	1868	2081	2294	2494	2693

PLATE 3. LEAF SHAPES



Before we begin measuring trees, let's take a moment to determine how many steps you should go for 66 feet. This will be done in the same fashion as determine your step count for pacing.

Trip # 1	
Trip # 2	
Trip # 3	
Trip # 4	
Trip # 5	
Total (add all 5 trips)	
Average # of steps (divide total by 5)	

Number of Steps for 66 feet = _____

Merchantable Height Practice

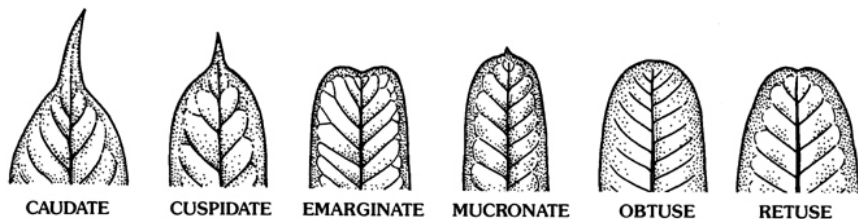
Tree 1	Tree 2	Tree 3	Tree 4	Tree 5

Step 3: Volume

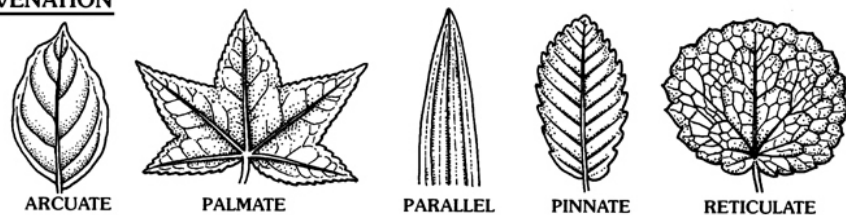
Finding the volume of the tree in board feet is the easiest part of this event. All that needs to be done is matching up the DBH and Merchantable Height measurements that were taken and by using a Tree Volume Table. This table is in chart form on the following page. All that needs to be done is to read across the chart until the DBH and Merchantable Height that was found for that tree, intersect. This needs to be repeated for each tree.

At the contest the Tree Volume Table will be provided.. Do NOT use the table that is provided on some types of Cruise Sticks.

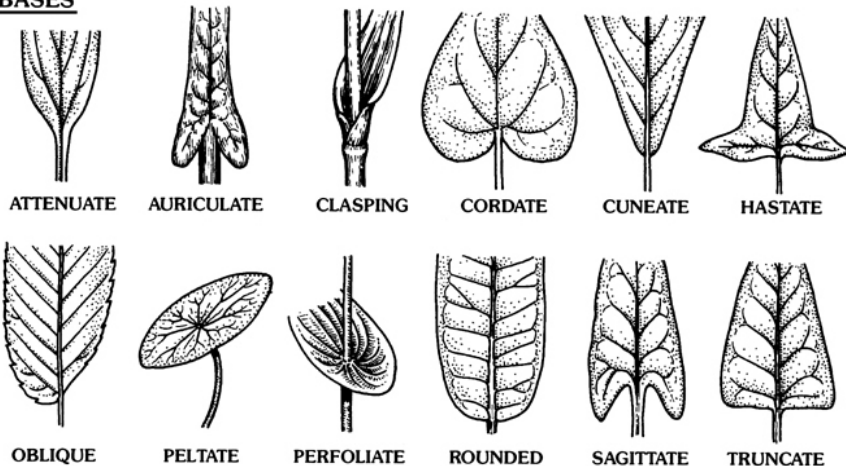
APICES



VENATION



BASES



TREE MEASUREMENT ESTIMATION
(Sawtimber Volume Estimation)

In this event, team members will be trying to find the usable amount of timber in a given plot of land. This is done by measuring the size of approximately 5 trees that are marked. 4-H'ers then estimate what the total usable acreage of timber would be from using the measurements of those marked trees.

4-H'ers will find:

1. Diameter breast height of the tree (DBH)
2. Merchantable height of the tree (number of usable 16-foot logs)
3. Volume of the tree in board feet
4. Total Plot Volume Per Acre

To obtain measurements 4-H'ers will use an official Cruise or Scale Stick, also referred to as a Biltmore Stick (it looks like a small yardstick). Contestants are NOT allowed to use any other type of instrument to measure the trees, including diameter tapes and calipers. Contestants will also need to use a calculator for this event. Today we will concentrate on learning to measure DBH and Height.

Step 1: DBH

The first step is to measure the diameter breast height (DBH) of the tree using the Cruise Stick. To do this the team member holds the stick 4 ½ feet off the ground and 25 inches from their eye. They look straight forward (without moving their head!), line up the stick on one side and get the reading in inches on the other side. When the stick is placed against the tree, close one eye to get the reading. Sticks should be held perpendicular to the tree.

It is a good idea to take diameter measurements all around the tree in several places so that an accurate measurement is found. If the tree is on a slope, DBH should be measured from the lowest side of the tree.

Pignut Hickory *Carya glabra*

Leaves are alternate, compound, with 5 (sometimes 7) leaflets. The terminal leaf is usually broader than the laterals. The stem is smooth.



Red Maple *Acer rubrum*

Leaves are opposite, 3 to 5 lobes with serrated sides, sinuses relatively shallow (but variable), 2 to 4 inches long; light green above, whitened and sometimes hairy beneath.

Red Mulberry *Morus rubra*

Leaves are 3 to 5 inches long, 2 ½ to 4 inches wide. They usually are contracted into a long point at the tip. Smooth or slightly roughened above and pale and hairy underneath.

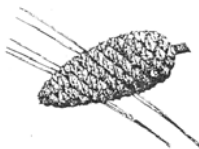


Redbud *Cercis canadensis*

Leaves are alternate, simple, and heart shaped. They are 3 to 5 inches long and wide. The leaves are thin and papery, and may be slightly hairy below.

Slash Pine *Pinus ellioti*

Needles are evergreen, 7 to 10 inches long, flexible, with three (sometimes two) needles per sheath and dark green in color. The cone is 3 to 6 inches and are brown at maturity and glossy.



Southern Red Oak - Quercus falcata

Leaves are alternate, simple, and 5 to 9 inches. Two forms are common: 3 lobes with shallow sinuses or 5 to 7 lobes with deeper sinuses. Lobes are bristle-tipped.



Tips for Pacing:

- Be consistent. Walk exactly the same way EVERY time.
- Wear the same shoes to pace each time. Generally, boots or sneakers work best.
- Make sure that you walk in a straight line
- Figure out your step factor several different times in different places.
- Start at the first flag with either their toe or their heel, and to start the same way each time.

Pacing Score Card		
Station	Number of steps	Distance in Feet
A to B		
B to C		
C to D		
Total		

Pacing Score Card		
Station	Number of steps	Distance in Feet
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Total		

3. Common Persimmon - leaves 2-6 inches long, soft and non-serrated
 4. Sourwood- leaves 3-7 inches long, double serrated, finely toothed
- B. Maple Family**
1. Boxelder - three leaflets to a leaf (looks like a boxer)
 2. Red Maple -three lobed leaf, red petiole
 3. Silver Maple- deeply five lobed leaf, silver gray on back side
 4. Sugar Maple - 3-5 lobed leaf, green petiole
- C. Nut Family**
1. Hickory Family
 - a. Mockernut Hickory - 7, sometimes 9 leaflets to a leaf
 - b. Pignut Hickory - 5, sometimes 7 leaflets to a leaf, leaf and stem smooth (slick as a pig)
 - c. Shagbark Hickory - 5, sometimes 7 leaflets to a leaf, leaf and stem smooth (Shaggy)
 2. Other Nut Trees
 - a. Black Walnut - leaves 12 to 12 inches long with 10-24 leaflets, no terminal leaflet.
 - b. Butternut- leaves 15-30 inches long with 11 to 17 leaflets, has a terminal leaf (bud scar looks like a monkey face)
 - c. Pecan - leaves 12-18 inches long with 9-15 curved leaflets
- D. Oak Family**
1. Red Oak Family -distinct spines or bristles on tips of lobes
 - a. Black Oak - leaves 4-10 inches long with 5-7 lobes, leaf hairy below
 - b. Northern Red Oak - leaves 5-9 inches long with 7-11 short pointed lobes, leaf lacks hairs
 - c. Sawtooth Oak - leaves elliptical with serrated edges and bristle teeth.
 - d. Scarlet Oak - leaves 3-6 inches long with

- e. 7-9 deeply divided lobes, petiole often reddish-green to red
 - f. Southern Red Oak - Two leaf forms, three lobed leaf with rounded bottom (southern bell) or 5-7 lobed leaf.
 - f. Turkey Oak - 3 or 5 deeply divided lobes, shaped like a turkey's foot.
2. Black/White Oak Family - spines or bristles absent or not noticeable
 - a. Blackjack Oak - leaves 7-9 inches long, narrow at base, broad at outer end, hairy below (shaped like a billy club)
 - b. Chestnut Oak - leaf shaped like a chestnut tree
 - c. Live Oak - 2-5 inches long, elliptical, margin has a distinct lip
 - d. Overcup Oak - 3-7 inches long with 5-9 sharp lobes, pointed at the base
 - e. Water Oak - tear drop or spatula shaped leaf
 - f. White Oak- 4-7 inches long, divided into finger-like, rounded lobes
- E. Other Fun Trees**
1. American Beech - Zig-Zag stem and cigar buds
 2. Catalpa - large heart-shaped - elephant ear thype leaf
 3. Eastern Cottonwood - deltoid shaped leaf, "heresy's kiss"
 4. Flowering Dogwood - leaf veins shaped like a minora
 5. Red Mulberry - cat's tongue
 6. Redbud - heart shaped leaf, "cupid tree"
 7. Sassafras - 3 leaf shapes, including a mitten and ghost
 8. Sweetgum - star shaped leaf
 9. Sycamore - leaf "dandruff"
 10. Yellow-poplar - cat face leaf