

2024 Florida 4-H Forest Ecology Contest



The **Florida 4-H Forest Ecology Contest** is held every year at the [Austin Cary Forest's Roland T. Stern Learning Center](#) in Gainesville, Florida. This is a competitive event that encourages youth to identify forest trees, plants, wildlife, and forest health stresses, and to demonstrate their knowledge of forest ecology and management, map and compass, tree measurement, forest management, and natural history. Youth at all three 4-H age levels can compete individually or in teams.

The 2024 contest will be held Saturday, March 30, 2024 at Austin Cary Forest.

In addition, to help youth prepare for the contest, a clinic is held in the fall to provide an opportunity for youth to learn from experts and practice and apply their knowledge and skills.

2024 CONTEST STATIONS

- ❖ **Tree Identification:** Identifying trees from their leaves and fruits
 - Juniors identify 15 species
 - Intermediates identify 20 species
 - Seniors identify 30 species
- ❖ **Forest Health:** Identifying insects, diseases, and stresses that affect forest health
 - Juniors identify 15 insects, diseases, or stresses
 - Intermediates identify 20 insects, diseases, or stresses
 - Seniors identify 30 insects, diseases, or stresses
- ❖ **Map and Compass:** Identifying topographic symbols and using a compass to navigate a course
 - Juniors answer 10 multiple-choice questions on identifying map symbols
 - Intermediates answer 10 multiple-choice questions on identifying map symbols and provide a compass bearing to reach a given point and pace out the distance between two points
 - Seniors answer 5 multiple-choice questions on identifying map symbols and complete a compass trail by providing the bearings and distances between three points
- ❖ **Forest Ecosystems:** Completing a multiple choice and true/false quiz on two forest ecosystems (Juniors and Intermediates)
 - Juniors watch a slide show to prepare
 - Intermediates read ecosystem descriptions to prepare
 - The 2024 ecosystems are Tropical Hammocks and Freshwater Swamps
- ❖ **Wildlife on a Forest Hike:** Identifying forest animals and ecosystem components on a hike
 - Juniors and Intermediates identify 20 species
- ❖ **Senior Tree Measurement & Forest Management:** to prepare seniors for the national contest, seniors will measure 4 standing trees and complete a multiple choice quiz on forest management
- ❖ **Quiz Bowl:** Senior teams will compete in a quiz bowl

SCHEDULE: DAY OF THE CONTEST

- Check-in will be from 8:30 AM to 9:00 AM; the contest will get underway at 9:00 AM.
- Groups will move through each of stations from 9:00 AM - 12:00 PM.
- Tree Identification Assistance, Nature Walk, or other outdoor activities will be conducted from 12:00 to 1:00 PM or until the scoring has concluded.
- Youth can eat their lunches between 12:00 and 1:00 PM.
- An Awards Ceremony will be held between 1:00 and 2:00 PM (the ceremony will begin whenever the judging is completed).
 - All youth receive a certificate of participation.
 - Winning teams and individuals receive ribbons (1st, 2nd, and 3rd place).
 - The 1st place Senior Team is eligible to compete at the National Forestry Invitational.
 - The 1st place Senior individual is eligible for a scholarship to the UF School of Forest, Fisheries, & Geomatics Sciences, if he or she chooses to attend, renewable annually.
- Volunteers are welcome to help chaperone groups, score quiz sheets, and assist individuals who require reading or writing assistance.

CONTEST REGISTRATION PROCESS

Complete registration forms on the 4-H Online website and send in \$10.00 per competing youth. Adults must also register but will not be charged a fee.

WHAT TO BRING

Clipboard, pencil, lunch, water bottle, shoes/socks, insect repellent, sunscreen, and forest ecology skills.

For more information about the contest, please go our web site:

<https://programs.ifas.ufl.edu/florida-4-h-forest-ecology/>.

Questions? Please contact Elise Cassie at ecassie@ulf.edu



Florida 4-H Forest Ecology Stations & Requirements

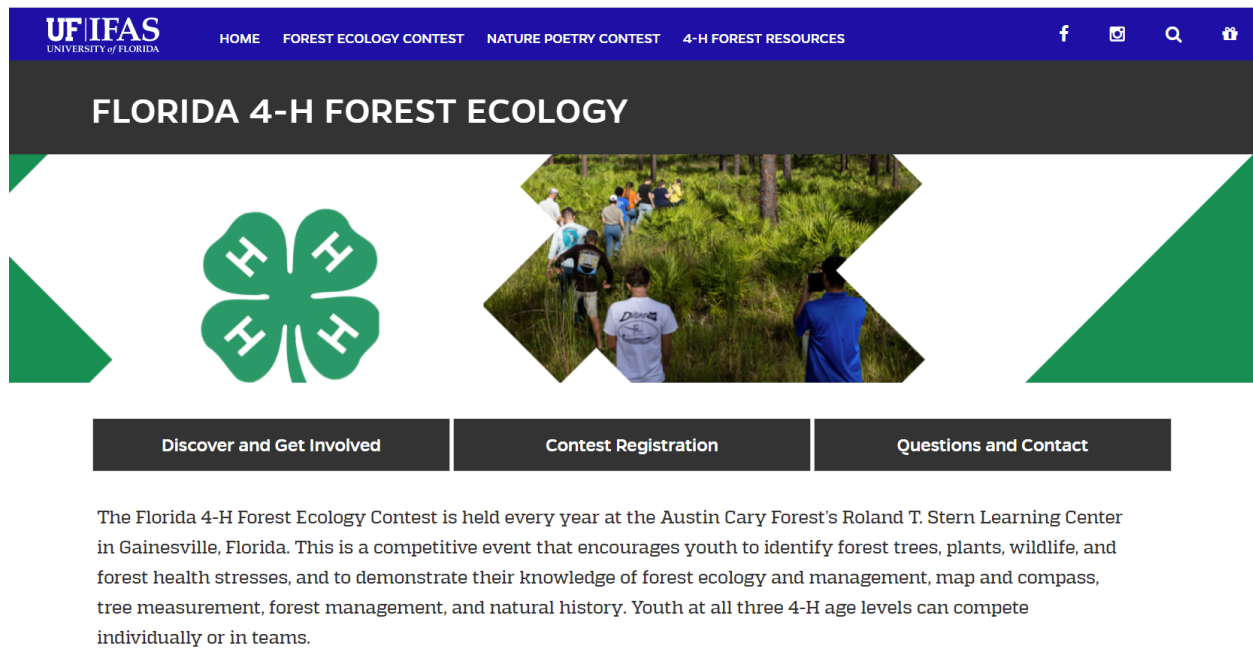
Station Name	Junior	Intermediate	Senior
Tree ID	ID 15 trees	ID 20 trees	ID 30 trees
Forest Health	ID 15 insects, diseases, or stresses	ID 20 insects, diseases, or stresses	ID 30 insects, diseases, or stresses
Forest Ecosystems Quiz	<p>Answer 10 multiple-choice or T/F questions from the ecosystem presentation</p> <p>2024 Ecosystems: Tropical Hammocks and Freshwater Swamps</p>	<p>Answer 10 multiple-choice or T/F questions from the ecosystem descriptions</p> <p>2024 Ecosystems: Tropical Hammocks and Freshwater Swamps</p>	N/A
Forest Management Quiz	N/A	N/A	Answer 10-20 multiple-choice or T/F questions on forest management and forestry
Map & Compass	<p>Maps: Answer 10 multiple-choice questions on identifying map symbols</p> <p>Compass: N/A</p>	<p>Maps: Answer 10 multiple-choice questions on identifying map symbols</p> <p>Compass: Provide a compass bearing to reach a given point and pace out the distance between two points</p>	<p>Maps: Answer 5 multiple-choice questions on identifying map symbols</p> <p>Compass: Complete a compass trail by providing the bearings and distances between three points</p>
Wildlife Hike	ID 20 animals	ID 20 animals	N/A
Tree Measurement	N/A	N/A	Measure the merchantable height and diameter of mature trees
Quiz Bowl	N/A	N/A	Teams compete one at a time in a timed session to answer 10 directed questions on forestry. Then, teams answer as many toss-up questions as possible in a speed bowl round

Florida 4-H Forest Ecology Contest Website

<https://programs.ifas.ufl.edu/florida-4-h-forest-ecology/>



The website includes detailed information on all of the contest stations as well as study resources, including videos! Additional study resources are added as needed or requested.



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FLORIDA 4-H FOREST ECOLOGY

Discover and Get Involved Contest Registration Questions and Contact

The Florida 4-H Forest Ecology Contest is held every year at the Austin Cary Forest's Roland T. Stern Learning Center in Gainesville, Florida. This is a competitive event that encourages youth to identify forest trees, plants, wildlife, and forest health stresses, and to demonstrate their knowledge of forest ecology and management, map and compass, tree measurement, forest management, and natural history. Youth at all three 4-H age levels can compete individually or in teams.

Please contact Elise Cassie (ecassie@ufl.edu) with any suggestions or if you have resources to add to the website. Thanks!

Florida 4-H Forest Ecology Senior Quiz Bowl

How it works:

- One team will compete at a time. We will bring teams into the classroom in alphabetical order by county. Parents, escorts and mentors of the competing team are welcome to observe. No recording devices are allowed. No notes or study materials are allowed.
- Because we have a smaller and sometimes uneven number of Senior teams compared to the national level, the “one team at a time” approach works best and more fairly. See more in “Notes”.
- Each team will compete in two events, Directed Questions and Toss-Up Questions, which will be scored independently. Each team will be asked the same questions. A judge is present to serve as a referee and may overrule the moderator’s decision regarding whether an answer is correct or not. In the event the judge and moderator have to deliberate over an answer given during the timed Toss-Up round, the timer shall stop to give the team 2 full minutes to answer questions. A timekeeper is also present. The Quiz Bowl follows the rules found in the “4-H Invitational Handbook”, with exception to the procedural differences outlined above.

The questions:

- **Directed Questions:**
 - The Directed Questions event involves 10 questions from the moderator to each team. After the question is read, the team has 30 seconds to discuss and agree upon the answer; the team may collaborate and discuss, but the team captain must answer the question. The captain may ask to have the question repeated within five seconds of hearing the question with no penalty.
 - Points/scoring:
 - Ten points are awarded for correct answers.
 - No credit is given to partial or incorrect answers.
 - There is no penalty for incorrect answers, either.
- **Toss-Up Questions:**
 - Is perhaps best described as the “speed bowl”. The moderator will ask as many questions as time permits, within a 2-minute period.
 - There are 20 questions in the question bank.
 - Unlike the Directed Questions, **any member of the team may answer**, and the answer may begin even before the moderator stops reading the question. The moderator will stop reading the question when the answer begins.
 - **No team discussion is allowed once a team member begins their answer.** If this occurs, the answer will be counted as incorrect.

- **Hint:** If no one on the team knows the answer, it may be to your advantage for the captain to say “pass” or otherwise indicate “don’t know” quickly. You will get more questions!
- Points/scoring:
 - A correct answer is awarded 10 points.
 - If the answer is incorrect, 5 points are taken from that team’s score.
 - If no answer is given, 0 points are rewarded.

Quiz Bowl Study Materials:

- Can be found at our website: <https://programs.ifas.ufl.edu/florida-4-h-forest-ecology/forest-ecology-contest/contest-stations/quiz-bowl/>
- They can also be found at the National 4-H Forestry Invitational website: <https://4hforestryinvitational.org/training/quiz-bowl-and-exam-study-guide>. Some questions are taken from the “Practice Questions” provided on the national site. Others are taken from the “Forestry Manuals” including Program A - Trees, Program B - Forests, and Program C - Recreation.

Notes:

- The national rules vary slightly from the Florida rules.
- In the National Forestry Invitational Forestry Bowl, a large number of Senior teams compete in paired team competition, with single elimination playoffs. Florida rules allow for smaller teams or an odd number of teams with every team being asked the same questions.
- The Florida contest does not take questions from the “Forests and Forestry” textbook listed at the national site because this is not available online.
- The National 4-H Forestry Invitational website is: <https://4hforestryinvitational.org/>

Florida 4-H Forest Ecology Contest Tree Species List

Common Name	Scientific Name	Juniors (ID 15 of 20)	Intermediates (ID 20 of 28)	Seniors (ID 30 of 50)
American basswood*	<i>Tilia americana</i>			X
American beech*	<i>Fagus grandifolia</i>			X
American elm*	<i>Ulmus americana</i>		X	X
American holly*	<i>Ilex</i>	X	X	X
American hornbeam	<i>Carpinus</i>			X
American sycamore*	<i>Platanus</i>	X	X	X
bald cypress*	<i>Taxodium</i>	X	X	X
black cherry*	<i>Prunus serotina</i>		X	X
black locust*	<i>Robinia</i>			X
black walnut*	<i>Juglans nigra</i>		X	X
blackgum*	<i>Nyssa sylvatica</i>			X
boxelder*	<i>Acer negundo</i>		X	X
Brazilian peppertree	<i>Schinus</i>			X
Carolina willow**	<i>Salix caroliniana</i>			X
Chinese tallow	<i>Triadica sebifera</i>		X	X
common persimmon*	<i>Diospyros</i>		X	X
eastern cottonwood*	<i>Populus deltoides</i>			X
eastern Hophornbeam	<i>Ostrya virginiana</i>			X
eastern redcedar*	<i>Juniperus</i>	X	X	X
Florida maple**	<i>Acer</i>			X
flowering dogwood*	<i>Cornus florida</i>	X	X	X
honeylocust*	<i>Gleditsia</i>			X
laurel oak	<i>Quercus laurifolia</i>	X	X	X
live oak*	<i>Quercus virginiana</i>	X	X	X
loblolly pine*	<i>Pinus taeda</i>	X	X	X
longleaf pine*	<i>Pinus palustris</i>	X	X	X
melaleuca	<i>Melaleuca</i>	X	X	X
mockernut hickory*	<i>Carya tomentosa</i>			X
pecan*	<i>Carya illinoensis</i>	X	X	X
pignut hickory*	<i>Carya glabra</i>	X	X	X
pond pine**	<i>Pinus serotina</i>			X
red buckeye**	<i>Aesculus pavia</i>			X
red maple*	<i>Acer rubrum</i>	X	X	X
red mulberry*	<i>Morus rubra</i>			X
redbay	<i>Persea borbonia</i>			X
river birch*	<i>Betula nigra</i>			X
sassafras*	<i>Sassafras albidum</i>	X	X	X
sea grape	<i>Coccoloba uvifera</i>			X
Shumard oak**	<i>Quercus</i>			X
silver maple*	<i>Acer saccharinum</i>			X
slash pine	<i>Pinus elliotii</i>		X	X
southern magnolia*	<i>Magnolia</i>	X	X	X
southern red oak*	<i>Quercus falcata</i>		X	X
sugarberry**	<i>Celtis laevigata</i>			X
sweetgum*	<i>Liquidambar</i>	X	X	X
tuliptree*	<i>Liriodendron</i>	X	X	X

More on back...

Florida 4-H Forest Ecology Contest Tree Species List

Common Name	Scientific Name	Juniors (ID 15 of 20)	Intermediates (ID 20 of 28)	Seniors (ID 30 of 50)
turkey oak	<i>Quercus laevis</i>	X	X	X
water oak*	<i>Quercus nigra</i>	X	X	X
waxmyrtle	<i>Myrica cerifera</i>	X	X	X
white ash*	<i>Fraxinus</i>			X
white oak*	<i>Quercus alba</i>			X

NOTE: Highlighted trees are considered invasive to Florida.

*Species is on the National 4-H Forestry Invitational list.

**Species may be used as a substitute to learn about the following species that are on the national list:

Carolina willow for black willow*

Florida maple for sugar maple*

pond pine for pitch pine*

red buckeye for yellow buckeye*

Shumard oak for scarlet oak*, northern red oak*, and black oak*


sugarberry for hackberry*

A Key to Florida Trees on the Junior 4-H Forest Ecology Contest


1a	Narrow, thin, needle-like "leaves"	Go to 2
1b	Broad, flat leaves	Go to 5
2a	Individual needles 2 cm long or shorter	Go to 3
2b	Individual needles longer than 2 cm	Go to 4
3a	Needles held close to the stem or pressed into stem	Eastern redcedar
3b	Needles spread from branchlet like a feather	baldcypress
4a	Bundled needles in groups of 3, seldom 2, 10-17 cm	loblolly pine
4b	Bundled needles in groups of 3, rarely 2, 20-30 cm	longleaf pine
5a	Compound leaf	Go to 6
5b	Simple leaf	Go to 7
6a	9-17 leaflets	pecan
6b	5-7 leaflets	pignut hickory
7a	Opposite arrangement	Go to 8
7b	Alternate arrangement	Go to 9
8a	Lobes, palmate shape	red maple
8b	No lobes, ovate shape, parallel veins	flowering dogwood
9a	Palmate shape	Go to 10
9b	Oval shape	
10a	Shallow lobes	Go to 11
10b	Deep lobes	Go to 12
11a	Leaf ends in sharp tip; leaf is wider in the middle	American sycamore
11b	Leaf ends in indentation; leaf is wider at the bottom	tuliptree
12a	Pointed tip on lobes, star shape	sweetgum
12b	Rounded tip on lobes, mitten shape	sassafras
13a	No lobes, elliptical to oval shape	Go to 14
13b	Lobes	Go to 18
14a	Teeth or bristle on margin	Go to 15
14b	Smooth margin	Go to 16
15a	Coarse serrated teeth, 5-10 cm, wedge base	waxmyrtle
15b	Sharp bristle tip, often spines, 5-10 cm, stiff	American holly
16a	Large leaf, 13-20 cm, leathery	Southern magnolia

A Key to Florida Trees on the Junior 4-H Forest Ecology Contest

16b	Medium to small leaf, less than 13 cm	Go to 17
17a	Wedge base, acute tip, 8-10 cm	laurel oak
17b	Tapering base, round tip, 5-13 cm, leathery	live oak
17c	Oval shape, parallel veins, 3-5 cm	melaleuca
18a	General shape is elliptical to oval	Go to 19
18b	Spatulate shape, variable leaves, 5-20 cm	water oak
19a	Deep lobes, 12-23 cm, bristle tip, bell shaped base	Southern red oak
19b	Deep narrow lobes, 5-30 cm, wedge shaped base	turkey oak

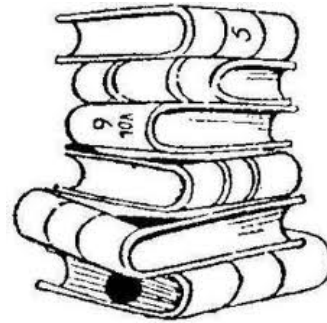






Press Your Own Leaves



You Will Need:

- A leaf to press
- Two sheets of newspaper
- One sheet of heavy paper
- A few heavy books
(textbooks, and dictionaries work well)



- 
1. Place your leaf between the two sheets of newspaper. Write the name of the species on the paper so you remember.
 2. Open one book to the center and insert your “leaf sandwich.” Close the book.
 3. Stack one or two heavy books on top of the book that contains the leaf.
 4. Let it sit for 1-2 weeks.
 5. Remove your leaf, carefully glue it to heavy paper, label the leaf, and add the page to your collection!
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TREE MEASUREMENTS - USING A BILTMORE STICK

Deborah B. Hill

To Measure Diameter

1. Diameter is measured at what is called Diameter Breast Height (DBH). This is 4.5 ft. (1.37 m) up the trunk from the ground. If the tree you are measuring is on a slope, diameter should be taken at 4.5 ft. (1.37 m) on the uphill side of the tree.
2. Hold the Biltmore stick against the tree at DBH, 25 in. (62.5 cm) from your eye. Make sure the edge of the stick that reads diameter is facing you.
3. Sight past the zero end of the stick and the edge of the tree.
4. Without moving your head, shift your eyes to other side of the tree and read the black diameter mark nearest to your line of sight.
5. Tree trunks usually are not round. If a trunk is very much out of round, you should measure both wide and narrow diameters and take the average of the two.

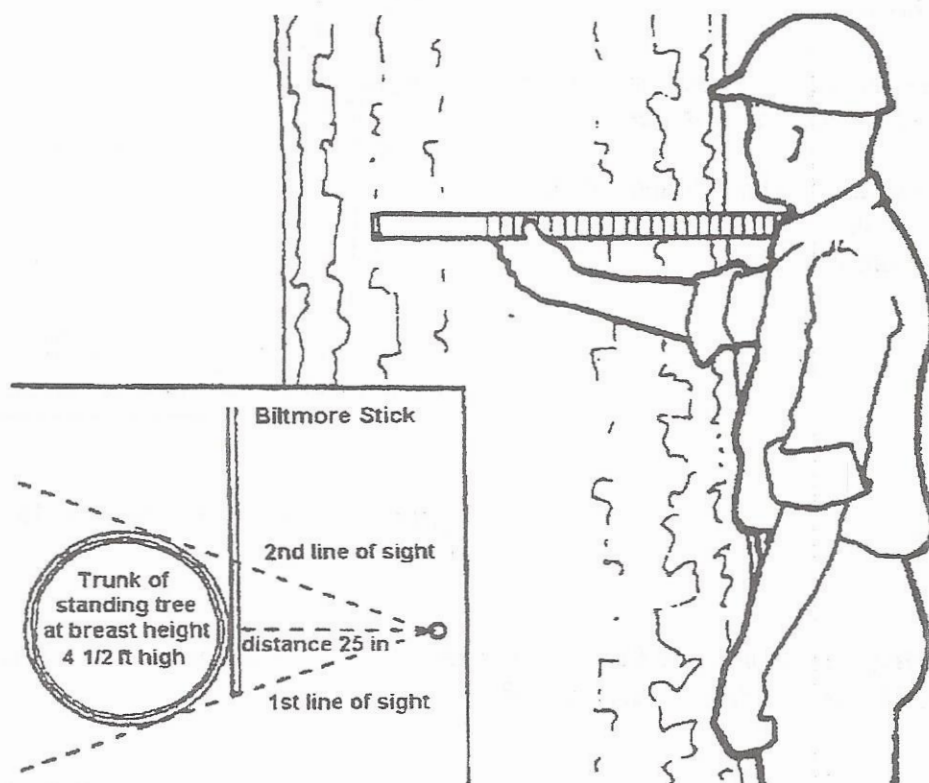


Figure 1. Using a Biltmore stick to find tree diameter.

To Measure Height

1. Stand 66 ft. (20.12 m) from the tree so that --
 - you are about on a level with the base of the tree. Walk out across the slope instead of up or down slope from the tree.
 - the tree is not leaning away from you.
 - you can see the top up to its merchantable height. If you are measuring for sawlogs, the merchantable height is the point where the top is 6 in. (15 cm) in diameter. For pulpwood, merchantable height is to a 3.6 in. (9 cm) diameter top; and for firewood, it is an 3.2 in. (8 cm) diameter top. Practice estimating these top diameters by standing back from a tree with a known diameter of 6, 3.6, or 3.2 inches (15, 9, or 8 cm) and comparing this to the tops of other trees.
2. Hold the stick vertically 25 in. (62.5 cm) from your eye with the lower end approximately at eye level and with the scale for measuring heights facing you.
3. Line up the zero end of the stick with the stump height - the height of the stump if the tree were cut. This is usually not more than 1 ft. (.3 m) from the ground.
4. Without moving your head or the stick, raise your eyes and sight to the merchantable top.
5. The nearest log mark or meter is the merchantable height of the tree.

Practice measuring heights and diameters to develop your skill before recording actual measurements from your plots.

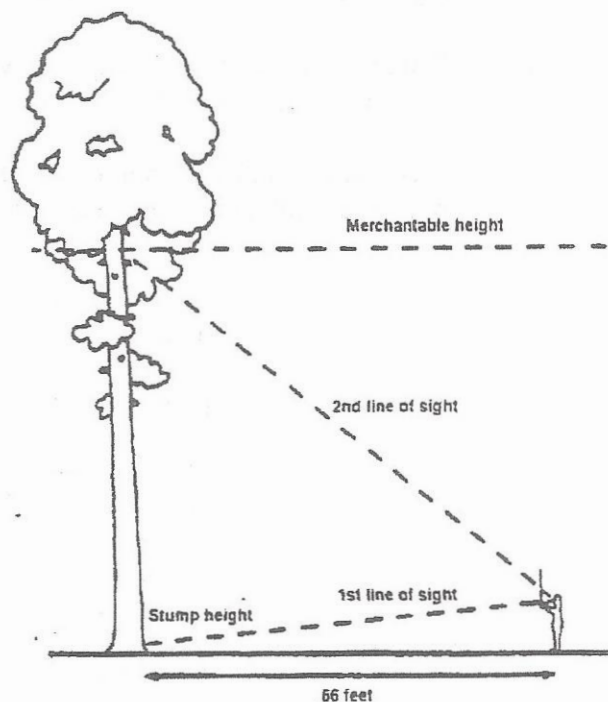


Figure 2. Measuring tree height with a Biltmore Stick.

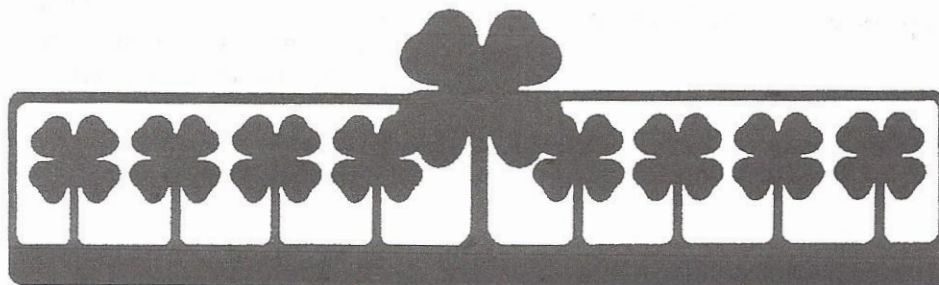
Note: Acknowledgment is made to Cornell University for the use of the material from their booklet entitled Understanding Forest Ecosystems.

(D. Hill 1.5M 9/98)

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4-H Forestry

Making a Tree Scale Stick



The first step in good forest management is the measurement of trees to establish a forest inventory. The most common tree measurements needed for inventory include DBH (diameter at breast height), merchantable height, and total height (Figure 1).

Many tools are available to take these measurements, but one of the simplest and easiest to use is the tree scale stick.

Although you can buy a tree scale, many people have enjoyed making personalized sticks. By following the directions in this project, you can construct a tree scale stick to measure trees accurately.

Under certain situations, your handmade tree scale stick can even outperform a manufactured stick. Some 4-H members with shorter arms find it impossible to hold a manufactured stick the required 25-inch distance from their eyes. You can make your stick for your arm length; therefore, tree measurements are more accurate. Also, manufactured sticks are not designed to measure total tree height, even though it is an important measurement.

Total height is needed to help determine pulpwood volumes in trees. You can make your stick to measure total height as easily as measuring merchantable height.

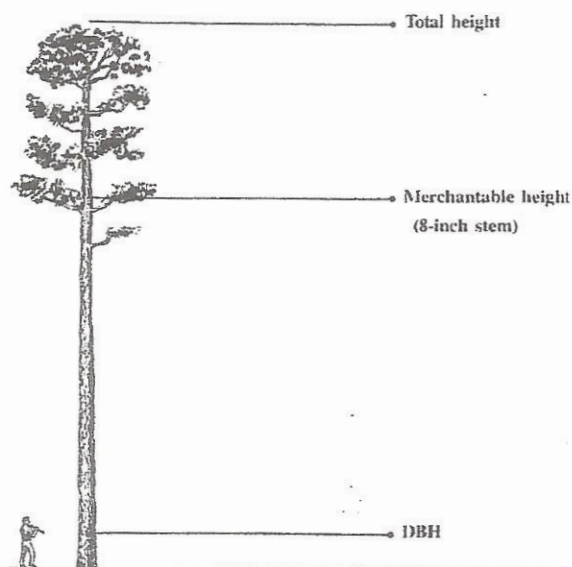


Figure 1. Three important tree measurements.

Project References

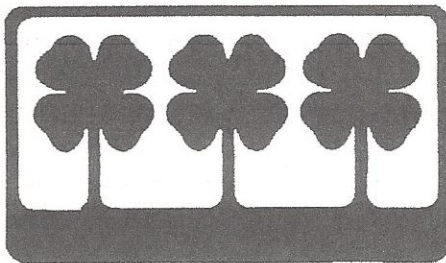
1. Extension Publication 2260 Are My Pine Trees Ready To Thin
2. Extension Publication 1473 4-H Forestry Project No. 7: Measuring Standing Sawtimber

Project Materials

1. A yardstick or similar-sized piece of wood
2. A tape measure in inches
3. A tape measure in centimeters
4. Three sheets of plain, unlined 8½- by 14-inch white paper
5. A fine point, permanent-ink pen
6. A long straightedge
7. Scissors
8. Glue
9. Scotch tape
10. Clear package tape, at least ½-inch wide

Sources of Help and Information

1. County Extension agent
2. 4-H volunteer leaders and parents
3. County forester, Mississippi Forestry Commission
4. District conservationist, Natural Resources Conservation Service, U.S. Department of Agriculture
5. District ranger, Forest Service, U.S. Department of Agriculture
6. Foresters with local forest industries
7. Consulting foresters, self-employed
8. Park managers, Mississippi Department of Wildlife, Fisheries, and Parks



Instructions

1. Measure your arm reach. Two arm-reach measurements are needed, one for measuring DBH and the other for measuring height, because you hold the tree scale stick differently to measure each. Correct measurement of your arm reach is critical. A mistake here will result in an inaccurate scale stick. Therefore, repeat arm-reach measurements at least twice to check for errors. Your arm reach will also change as you grow, so every year check your arm reach, and if it has changed, make a new tree scale stick.

Let's measure arm reach for DBH first. Hold the yardstick sideways against a large tree, just as if DBH were being measured (P1473 4-H Forestry Project No. 7: Measuring Standing Sawtimber). Grasp and hold the stick on its lower edge near where the stick touches the tree. The upper edge will have the DBH measurement scale, which you do not want to cover with your hand. In addition, hold your arm straight and in a comfortable position, since this is how you always will measure DBH.

Have a friend use the tape measure (inches) and determine the distance from the bone next to your eye to the yardstick (Figure 2). Hold the tape straight and tight and round off the measured distance to the nearest inch. This is your arm reach for DBH measurement. Record it below:

My arm reach for measuring DBH is _____ inches.

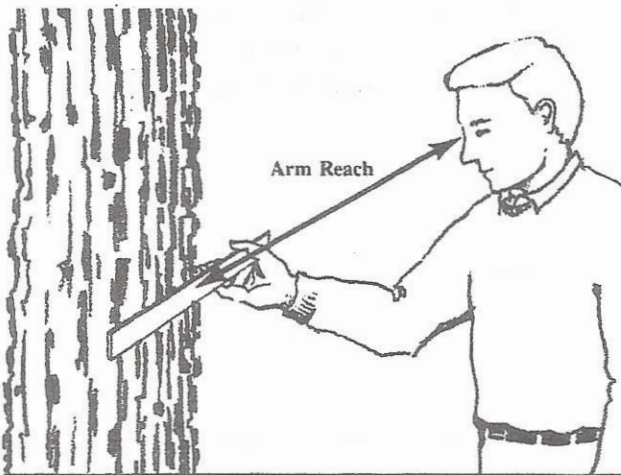


Figure 2. Determine your arm reach for DBH measurement.

2. Now, determine arm reach for total and merchantable height measurements. Measure 66 feet (1 chain) from a tree, look back at the tree, and hold the yardstick vertical as if merchantable height were being measured (P1473 4-H Forestry Project No. 7: Measuring Standing Sawtimber). Again, make sure you hold your arm straight and comfortably since you must hold it this way for all future height measurements.

As you did before for DBH, have your friend measure the distance from your eye bone to the yardstick and round off the distance to the nearest inch (Figure 3). This is your arm reach for height measurements. Record this measurement below:

My arm reach for measuring height is _____ inches.

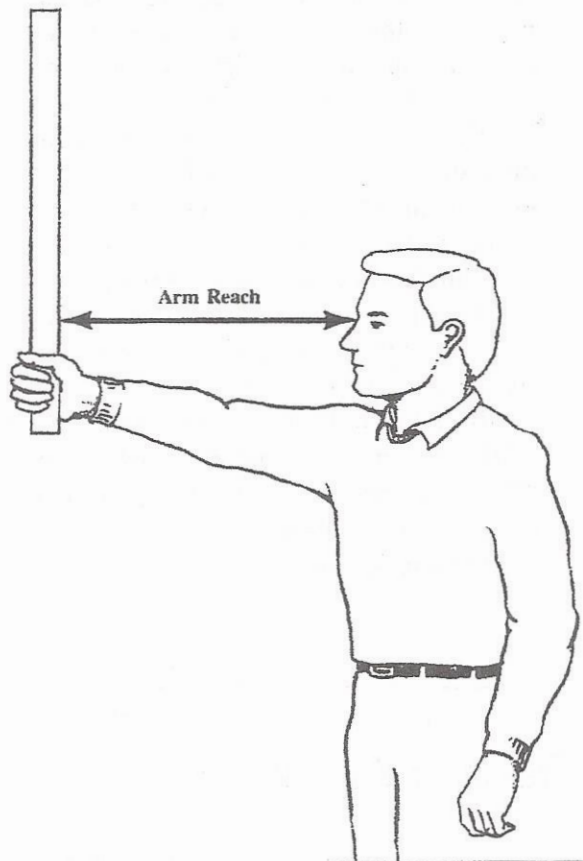


Figure 3. Determine your arm reach for height measurements.

3. Prepare your paper. Place three sheets of legal-size paper end to end on a table and allow them to overlap approximately $\frac{1}{4}$ inch. Tape the sheets together on one side, then flip the sheets over. Take the pen and straight-edge and draw three parallel lines the length of the paper (36 inches long and 1 inch apart). The first line will be used to mark off the scale for DBH measurement, the second for merchantable height, and the third total height. Each scale will be specific for your particular arm reach.

4. Mark your scale for DBH measurement. Look at Table 1. The far left column is actual tree DBH, while remaining columns in the table show distances to mark off on the tree scale stick to measure DBH accurately. As you will notice, scale distances are in centimeters, not inches, making it easier for you to measure distances.

Look at the top of Table 1 for the length of your arm reach for measuring DBH. Each number in that column below your arm reach is a distance on the scale stick that corresponds to a tree DBH on the same row.

Using a tape measure (centimeters) and pen, mark the distance for each DBH along the scale line you already drew. Remember always to measure from the far left-hand edge of the scale line, which is the zero point (DBH=0).

Hold the paper sideways, and number each mark along the scale line with the tree DBH it corresponds with (Figure 4). Be sure to print neatly and include instructions for measuring DBH with your tree scale stick. For example, "Tree diameter (inches), hold _____ inches from eye." (Fill in the blank with your arm reach for DBH measurement.)

5. Mark your scale for measuring merchantable height. Look at Table 2. This table shows how to mark off distances on the tree scale stick to correspond to different merchantable heights. Use this table as you did Table 1.

Find your arm reach for measuring heights, and place a mark at the correct distances along the scale line for each log and half-log length. Turn the paper straight up and down to write the number of logs next to each mark on the scale. Numbers written this way will be easy to read when heights are measured (Figure 4).

Include instructions for measuring merchantable height with your tree scale stick. For example, "Merchantable height (number of 16-foot lots), pace 66 feet from tree, and hold stick _____ inches from eye." (Fill in the blank with your arm reach for height measurements.)

6. Mark your scale for measuring total height. Look at Table 3. This table shows how to mark off distances on the tree scale stick to correspond to different total heights. Use this table as you did Tables 1 and 2.

Find your arm reach for measuring heights, and place a mark at the correct distance along the scale line for height (feet). Again, turn the paper straight up and down to write the heights, in feet, next to each mark so they will be easy to read (Figure 4).

Include instructions for measuring total height with your tree scale stick. For example, "Total height (feet), pace 66 feet from tree, and hold stick _____ inches from eye." Fill in the blank with your arm reach for height measurements.

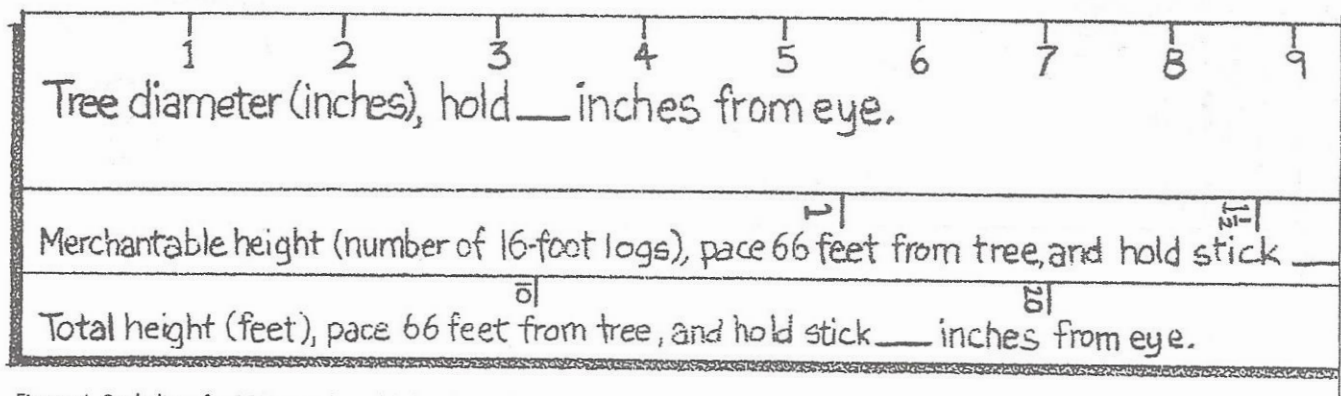


Figure 4. Scale lines for DBH, merchantable height, and total height.

7. Assemble your tree scale stick. Carefully cut out the three scale lines—DBH, merchantable height, and total height. The DBH scale can be 1 inch wide and the two height scales can each be $\frac{1}{2}$ inch wide. Lightly glue the DBH scale on the front of the yardstick and the two height scales on the back. When gluing, line up the zero point with the left-hand edge of the yardstick. In addition, line up the top edge of the DBH scale line as close to the upper edge of the yardstick as possible. Place one height scale near the upper edge and one near the lower.

After the glue has dried, place clear packaging tape over the tree scale lines to protect them from water and dirt. Your tree scale stick is now ready to use.

Using the tree scale stick to measure DBH and merchantable height is fully explained in P1473 4-H Forestry Project No. 7: Measuring Standing Sawtimber. Total tree height measurement may be something you are not familiar with. It is explained next.

8. Measure total height. Total height is measured by holding the scale stick vertically one arm reach from your eye while standing at a distance of 66 feet (one chain) from the tree. With one eye, line up the bottom of the scale stick with the point where the tree stem touches the ground.

Now, without moving your head, sight on the very uppermost reach of the main stem and find the adjacent total height value on the scale stick.

You can measure most trees accurately if you stand 66 feet from them. Exceptions are very large trees (greater than 80 feet in height) and very small trees (less than 30 feet). If a tree is more than 80 feet in height, pace away from the tree an additional 66 feet, making the total distance two chains or 132 feet. Measure total height normally, and whatever height you see on the scale, multiply it by 2 to get the correct height of the tree.

For trees shorter than 30 feet, pace only two chains, or 33 feet, from the tree. Measure the height, and divide the reading on the scale stick by two to get the correct tree height. With these two tricks you should be able to measure the height of any tree.

Summary

- Collect project materials.
- Determine your arm reach for DBH and height measurements.
- Draw three lines, 36 inches in length, on paper. Use the first line for the DBH scale, the second for merchantable height, and the third for total height.
- Based on your arm length, locate the correct distances for scale lines in the tables.
- Mark off each scale, starting from the left edge as zero.
- Cut out the scale lines and assemble your scale stick.

Now get out there and have fun measuring trees!

Table 1. Scale graduations for DBH (diameter at breast height). Mark off distances on the scale line, starting at the left-hand edge (zero point).

DBH (inches)	Arm Reach (inches)										
	20	21	22	23	24	25	26	27	28	29	30
	Distance in centimeters										
1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
2	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
3	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.3
4	9.3	9.3	9.3	9.4	9.4	9.4	9.5	9.5	9.5	9.5	9.5
5	11.4	11.4	11.5	11.5	11.6	11.6	11.6	11.7	11.7	11.7	11.8
6	13.4	13.4	13.5	13.6	13.6	13.7	13.7	13.8	13.8	13.9	13.9
7	15.3	15.4	15.5	15.6	15.6	15.7	15.8	15.8	15.9	16.0	16.0
8	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.8	17.9	18.0	18.1
9	19.0	19.1	19.3	19.4	19.5	19.6	19.7	19.8	19.9	20.0	20.0
10	20.7	20.9	21.1	21.2	21.3	21.5	21.6	21.7	21.8	21.9	22.0
11	22.4	22.6	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.8	23.9
12	24.1	24.3	24.5	24.7	24.9	25.1	25.2	25.4	25.5	25.6	25.8
13	25.7	26.0	26.2	26.4	26.6	26.8	27.0	27.1	27.3	27.4	27.6
14	27.3	27.6	27.8	28.0	28.3	28.5	28.7	28.9	29.0	29.2	29.4
15	28.8	29.1	29.4	29.6	29.9	30.1	30.3	30.5	30.7	30.9	31.1
16	30.2	30.6	30.9	31.2	31.5	31.7	32.0	32.2	32.4	32.6	32.8
17	31.7	32.1	32.4	32.7	33.0	33.3	33.6	33.8	34.1	34.3	34.5
18	33.2	33.5	33.9	34.2	34.6	34.9	35.1	35.4	35.7	35.9	36.1
19	34.6	35.0	35.4	35.7	36.1	36.4	36.7	37.0	37.2	37.5	37.8
20	35.9	36.4	36.8	37.2	37.5	37.9	38.2	38.5	38.8	39.1	39.3
21	37.3	37.7	38.2	38.6	39.0	39.3	39.7	40.0	40.3	40.6	40.9
22	38.6	39.1	39.5	39.9	40.4	40.8	41.1	41.5	41.8	42.1	42.4
23	39.8	40.4	40.8	41.3	41.7	42.2	42.6	42.9	43.3	43.6	44.0
24	41.1	41.6	42.2	42.6	43.1	43.5	44.0	44.4	44.7	45.1	45.4
25	42.3	42.9	43.4	44.0	44.4	44.9	45.3	45.8	46.2	46.5	46.9
26	43.5	44.1	44.7	45.2	45.8	46.2	46.7	47.1	47.6	48.0	48.3
27	44.7	45.4	46.0	46.5	47.0	47.6	48.0	48.5	48.9	49.4	49.8
28	45.9	46.6	47.2	47.8	48.3	48.8	49.3	49.8	50.3	50.7	51.1
29	47.1	47.7	48.4	49.0	49.6	50.1	50.6	51.1	51.6	52.1	52.5
30	48.2	48.9	49.6	50.2	50.8	51.4	51.9	52.4	52.9	53.4	53.9
31	49.3	50.0	50.7	51.4	52.0	52.6	53.2	53.7	54.2	54.7	55.2
32	50.4	51.2	51.9	52.6	53.2	53.8	54.4	55.0	55.5	56.0	56.5
33	51.5	52.3	53.0	53.7	54.4	55.0	55.6	56.2	56.8	57.3	57.8
34	52.6	53.4	54.1	54.9	55.6	56.2	56.8	57.4	58.0	58.6	59.1
35	53.6	54.4	55.2	56.0	56.7	57.4	58.0	58.7	59.3	59.8	60.4
36	54.6	55.5	56.3	57.1	57.8	58.5	59.2	59.9	60.5	61.1	61.6
37	55.7	56.5	57.4	58.2	58.9	59.7	60.4	61.0	61.7	62.3	62.9
38	56.7	57.6	58.4	59.3	60.1	60.8	61.5	62.2	62.9	63.5	64.1
39	57.7	58.6	59.5	60.3	61.1	61.9	62.7	63.4	64.0	64.7	65.3
40	58.7	59.6	60.5	61.4	62.2	63.0	63.8	64.5	65.2	65.9	66.5
41	59.6	60.6	61.5	62.4	63.3	64.1	64.9	65.6	66.3	67.0	67.7
42	60.6	61.6	62.5	63.5	64.3	65.2	66.0	66.7	67.5	68.2	68.9
43	61.5	62.6	63.5	64.5	65.4	66.2	67.0	67.8	68.6	69.3	70.0
44	62.5	63.5	64.5	65.5	66.4	67.3	68.1	68.9	69.7	70.4	71.2
45	63.4	64.5	65.5	66.5	67.4	68.3	69.2	70.0	70.8	71.6	72.3
46	64.3	65.4	66.5	67.5	68.4	69.3	70.2	71.1	71.9	72.7	73.4
47	65.2	66.3	67.4	68.4	69.4	70.3	71.2	72.1	72.9	73.7	74.5
48	66.1	67.3	68.3	69.4	70.4	71.3	72.3	73.2	74.0	74.8	75.6
49	67.0	68.2	69.3	70.3	71.4	72.3	73.3	74.2	75.1	75.9	76.7
50	67.9	69.1	70.2	71.3	72.3	73.3	74.3	75.2	76.1	76.9	77.8
51	68.8	70.0	71.1	72.2	73.3	74.3	75.3	76.2	77.1	78.0	78.8
52	69.6	70.8	72.0	73.1	74.2	75.3	76.3	77.2	78.1	79.0	79.9
53	70.5	71.7	72.9	74.1	75.2	76.2	77.2	78.2	79.1	80.1	80.9
54	71.3	72.6	73.8	75.0	76.1	77.2	78.2	79.2	80.1	81.1	82.0
55	72.1	73.4	74.7	75.9	77.0	78.1	79.1	80.2	81.1	82.1	83.0
56	73.0	74.3	75.5	76.7	77.9	79.0	80.1	81.1	82.1	83.1	84.0
57	73.8	75.1	76.4	77.6	78.8	79.9	81.0	82.1	83.1	84.1	85.0
58	74.6	76.0	77.2	78.5	79.9	80.9	82.0	83.0	84.1	85.1	86.0
59	75.4	76.8	78.1	79.4	80.6	81.8	82.9	84.0	85.0	86.0	87.0
60	76.2	77.6	78.9	80.2	81.5	82.7	83.8	84.9	86.0	87.0	88.0

Table 2. Scale graduations for merchantable height. Mark off distances on the scale line, starting at the left-hand edge (zero point).

Height (number of 16-foot logs)	Arm Reach (inches)										
	20	21	22	23	24	25	26	27	28	29	30
	Distance in centimeters										
1	12.3	12.9	13.5	14.2	14.8	15.4	16.0	16.6	17.2	17.9	18.5
1.5	18.5	19.4	20.3	21.2	22.2	23.1	24.0	24.9	25.9	26.8	27.7
2	24.6	25.9	27.1	28.3	29.6	30.8	32.0	33.3	34.5	35.7	36.9
2.5	30.8	32.3	33.9	35.4	36.9	38.5	40.0	41.6	43.1	44.6	46.2
3	36.9	38.8	40.6	42.5	44.3	46.2	48.0	49.9	51.7	53.6	55.4
3.5	43.1	45.3	47.4	49.6	51.7	53.9	56.0	58.2	60.3	62.5	64.6
4	49.3	51.7	54.2	56.6	59.1	61.6	64.0	66.5	69.0	71.4	73.9
4.5	55.4	58.2	61.0	63.7	66.5	69.3	72.0	74.8	77.6	80.4	83.1
5	61.6	64.7	67.7	70.8	73.9	77.0	80.0	83.1	86.2	89.3	92.4

Table 3. Scale graduations for total height. Mark off distances on the scale line starting at the left-hand edge (zero point).

Total height (feet)	Arm Reach (inches)										
	20	21	22	23	24	25	26	27	28	29	30
	Distance in centimeters										
10	7.7	8.1	8.5	8.9	9.2	9.6	10.0	10.4	10.8	11.2	11.5
20	15.4	16.2	16.9	17.7	18.5	19.2	20.0	20.8	21.6	22.3	23.1
30	23.1	24.2	25.4	26.6	27.7	28.9	30.0	31.2	32.3	33.5	34.6
40	30.8	32.3	33.9	35.4	36.9	38.5	40.0	41.6	43.1	44.6	46.2
50	38.5	40.4	42.3	44.3	46.2	48.1	50.0	52.0	53.9	55.8	57.7
60	46.2	48.5	50.8	53.1	55.4	57.7	60.0	62.3	64.7	67.0	69.3
70	53.9	56.6	59.3	62.0	64.7	67.3	70.0	72.7	75.4	78.1	80.8
80	61.6	64.7	67.7	70.8	73.9	77.0	80.0	83.1	86.2	89.3	92.4

**Florida 4-H Forest Ecology Contest
Forest Health Dichotomous Keys
(Junior, Intermediate, & Senior)**

FLORIDA 4-H FOREST ECOLOGY CONTEST
FOREST HEALTH DICHOTOMOUS KEY
JUNIOR

- 1a Tree damage is caused by an insect go to 2
- 1b Tree damage is not caused by an insect go to 7

- 2a Damage is caused by a larvae or caterpillar go to 3
- 2b Damage is not caused by a larvae or caterpillar go to 4

- 3a The insects live in a web that is no bigger than a basketball,
is found in the branch unions of fruit trees (apple, cherry,
plum) and the insects leave their webs to feed Eastern tent
caterpillar
- 3b The insects live in and feed inside of their web, the web can
cover large parts of hardwood tree canopies Fall webworm

- 4a The tree damage is caused by a large insect depositing its
eggs in 1/4-1/2" diameter branches using an ovipositor..... Cicada
- 4b The insects are not as described above and are beetles go to 5

- 5a The beetle is the largest bark beetle in the southeastern
United States, its damage is seen in the lower 10 ft of the
tree stem, as is associated with large globs of resin Black turpentine
beetle
- 5b The beetle is not as described above go to 6

- 6a The beetle makes "noodles" of wood tissue that it pushes
out of the tree as it bores into the wood, it has a symbiotic
relationship with a fungus that it eats Ambrosia beetle
- 6b The beetle has 1/8" exit holes, its galleries are made up of
individual chambers for their grubs to mature in and feed on
the inner bark of the tree Southern pine
beetle

- 7a The damage is caused by a fungus or living organism go to 8
- 7b The damage is caused by environmental occurrences,
human-made, or parasitic plant go to 13

- 8a The damage to the tree is best described as a canker go to 9
- 8b Not as described above go to 10

- 9a The canker is often found on oak trees and other hardwoods, it can appear smooth black or grey..... Hypoxylon canker
- 9b The canker is found on pine and is associated with a lot of resin or pitch production by the tree Pitch canker
- 10a The disease has two different host plants from two different tree species..... go to 11
- 10b Not as described above go to 12
- 11a The two hosts are red cedar (*Juniperus virginiana*) and apples or crabapple (*Malus* species), on the cedar it produces large round galls and on the apple causes orange leaf spots Cedar apple rust
- 11b The two hosts are pine (loblolly and slash, especially) and oak (water, willow, and laurel), the fungus causes galls to form on branches of the pine and leaf spots on the oak..... Fusiform rust
- 12a The fungus grows as clusters of mushrooms at the base of trees like a little “army”, it can also grow rhizomorphs that look like black-brown shoestrings..... Armillaria root rot
- 12b The fungus infects the needles of pine trees and causes them to turn red-brown and be prematurely dropped from the tree Needlecast
- 13a The damage are V-shaped grooves cut into the bark of trees, it was caused by humans during the collection of pine resin from trees to make turpentine, is sometimes associated with metal attached to the tree Catface
- 13b Not as described above go to 14
- 14a Damage looks like vertical slashes in the tree’s bark and is caused by giant sparks of electricity Lightning
- 14b The damage looks like a green plant growing on the branches of its host tree, it does not lose its leaves in the winter, is a higher parasitic plant Mistletoe

FLORIDA 4-H FOREST ECOLOGY CONTEST
FOREST HEALTH DICHOTOMOUS KEY
INTERMEDIATE

- 1a Tree damage is caused by an insect.....go to 2
- 1b Tree damage is not caused by an insectgo to 12

- 2a Damage is caused by a larvae or caterpillar.....go to 3
- 2b Damage is not caused by a larvae or caterpillargo to 7

- 3a The caterpillar or larvae make webs to live ingo to 4
- 3b The caterpillar or larvae do no make webs to live ingo to 6

- 4a The caterpillar or larvae make their webs in the tips of pine tree and the webs are often brown because of the frassPine webworm
- 4b Not as described above.....go to 5

- 5a The caterpillar or larvae feed in group on pine trees and move together to mimic a larger animal as a defense mechanism.....Pine sawflies
- 5b Not as described above.....go to 6

- 6a The insects live in a web that is no bigger than a basketball, is found in the branch unions of fruit trees (apple, cherry, plum) and the insects leave their webs to feedEastern tent caterpillar
- 6b The insects live in and feed inside of their web, the web can cover large parts of hardwood tree canopiesFall webworm

- 7a The tree damage is caused by an adult insect laying its eggsgo to 8
- The insects are not as described above and are beetlesgo to 9

- 8a large insect depositing its eggs in 1/4-1/2" diameter branches using an ovipositor, adult insect is 2" long.....Cicada
- 8b Adult insect is a moth and it deposits her eggs in the tips of newly growing pine branchesPine tip moth

- 9a The beetle is the largest bark beetle in the southeastern United States, its damage is seen in the lower 10 ft of the tree stem, as is associated with large globs of resinBlack turpentine beetle
- 9b The beetle is not as described above.....go to 6a

- 10a The beetle gallery is just under the surface of the barkgo to 11

- 10b The beetle makes “noodles” of wood tissue that it pushes out of the tree as it bores into the wood, it has a symbiotic relationship with a fungus that it eatsAmbrosia beetle
- 11a The beetle has 1/8” exit holes, its galleries are made up of individual chambers for their grubs to mature in and feed on the inner bark of the pine tree.....Southern pine beetle
- 11b The beetle makes X-shaped galleries under the bark of pine treesIps beetle
- 12a The damage is caused by a fungus or bacteriumgo to 13
- 12b The damage is caused by environmental occurrences, are human-made, or parasitic plant.....go to 21
- 13a The damage to the tree is best described as a cankergo to 14
- 13b Not as described above.....got to 16
- 14a The canker is caused by a bacterium that makes the dead branches appear blackened and have a shepherd’s hook appearanceFireblight
- 14b Not as described above.....go to 15
- 15a The canker is often found on oak trees and other hardwoods, it can appear smooth black or grey.....Hypoxylon canker
- 15b The canker is found on pine and is associated with a lot of resin or pitch production by the tree.....Pitch canker
- 16a The disease has two different host plants from two different tree speciesgo to 17
- 16b Not as described above.....go to 18
- 17a The two hosts are red cedar (*Juniperus virginiana*) and apples or crabapple (*Malus species*), on the cedar it produces large round galls and on the apple causes orange leaf spots.....Cedar apple rust
- 17b The two hosts are pine (loblolly and slash, especially) and oak (water, willow, and laurel), the fungus causes galls to form on branches of the pine and leaf spots on the oakFusiform rust
- 18a The fungus grows at the base of treesgo to 19
- 18b The disease is found on the leaves or needles of the host plant.....go to 20

- 19a The fungus grows at the base of a conifers, it grows as a
 conk or shelf-fungus, is brown with a white edge (margin).....Annosus root rot
- 19b The fungus grows as clusters of mushrooms at the base of
 trees like a little “army”, it can also grow rhizomorphs that
 look like black-brown shoestrings.....Armillaria root rot
- 20a The fungus infects leaves of oak trees causing raised bumps
 on the leaves that appear a lighter shade of greenOak leaf blister
- 20b The fungus infects the needles of pine trees and causes
 them to turn red-brown and be prematurely dropped from
 the treeNeedlecast
- 13a The damage are V-shaped grooves cut into the bark of trees,
 it was caused by humans during the collection of pine resin
 from trees to make turpentine, is sometimes associated with
 metal attached to the tree.....Catface
- 13b Not as described above.....go to 14
- 14a The damage appears as an overgrowth of tissue that can be
 round, oval, or elongated, they can appear on branches,
 stems, or leaves, and can be cause by insects, diseases, or
 abiotic factorsGalls
- 14b Not as described above.....go to 15
- 15a Damage looks like vertical slashes in the tree’s bark and is
 caused by giant sparks of electricityLightning
- 15b The damage looks like a green plant growing on the
 branches of its host tree, it does not lose its leaves in the
 winter, is a higher parasitic plant.....Mistletoe

FLORIDA 4-H FOREST ECOLOGY CONTEST
FOREST HEALTH DICHOTOMOUS KEY
SENIOR

- 1a Tree damage is caused by an insect go to 2
- 1b Tree damage is not caused by an insect go to 15

- 2a Damage is caused by a larvae or caterpillar go to 3
- 2b Damage is not caused by a larvae or caterpillar go to 8

- 3a The caterpillar or larvae make silk webs to live in go to 4
- 3b The caterpillar or larvae do no make webs to live in go to 6

- 4a The caterpillar or larvae make their silk webs in the branch tips of
pine tree and the webs are often brown because of the frass Pine webworm
- 4b Not as described above go to 5

- 5a The insects live in a silk web that is no bigger than a basketball, is
found in the branch unions of fruit trees (apple, cherry, plum) and the
insects leave their webs to feed Eastern tent caterpillar
- 5b The insects live in and feed inside of their web, the web can cover
large parts of hardwood tree canopies Fall webworm

- 6a The caterpillar or larvae feed in group on pine trees and move
together to mimic a larger animal as a defense mechanism Pine sawflies
- 6b Not as described above go to 7

- 7a The tree damage is caused by an adult insect laying its eggs with an
ovipositor in slits on the underside of twigs go to 8
- 7b Not as described above go to 10

- 8a Large insect with membranous wings deposit its eggs in 1/4-1/2"
diameter branches using an ovipositor, adult is 2" long Cicada
- 8b Not as described above go to 9

- 9a Adult insect is a moth and it lays her eggs in the tips of newly growing
pine branches Pine tip moth
- 9b Adult chews through the bark and wood of a branch and lays her eggs
in the end of the branch, which falls off and overwinters on the
ground Twig girdler

- 10a The insect is found on the underside of sycamore leaves, the insects' wings are lacey appearing, even if the insect is not found black tar-like dots of frass can be found, leaves have stippling from feeding Sycamore lace bug
- 10b Insect is not a beetle go to 14
- 10c Insect is a beetle..... go to 11
- 11a The beetle is the largest bark beetle in the southeastern United States, its damage is seen in the lower 10 ft of the tree stem, as is associated with large globs of resin Black turpentine beetle
- 11b The beetle is not as described above go to 12
- 12a The beetle gallery is just under the surface of the bark..... go to 13
- 12b The beetle makes "noodles" of wood it pushes out of the tree as it bores into the wood, it has a symbiotic relationship with a fungus that it eats Ambrosia beetle
- 13a The beetle has 1/8" exit holes, its galleries are made up of individual chambers for their grubs to mature in and feed on the inner bark of the pine tree..... Southern pine beetle
- 13b The beetle makes X-shaped galleries under the bark of pine trees..... Ips beetle
- 13c The beetle is tan with black spots and feeds on the leaves of cottonwoods and other *Poplar* species..... Cottonwood leaf beetle
- 14a The insect is an adult female that looks like a dome-like bump on the branch, twig, or needles. The insect is stationary and uses its piercing-and-sucking mouthparts to connect to the branches to feed..... Scale insects
- 14b The insect feeds on young bald cypress leaves. Their feeding causes the leaves to grow a gall. Cypress twig gall
- 15a The damage is caused by a fungus or bacterium go to 16
- 15b The damage is caused by environmental occurrences, are human-made, or parasitic plant go to 30
- 16a The damage to the tree is best described as a canker go to 17
- 16b Not as described above go to 20
- 17a The canker is caused by a bacterium that makes the dead branches appear blackened and have a shepherd's hook appearance Fireblight
- 17b Not as described above go to 18

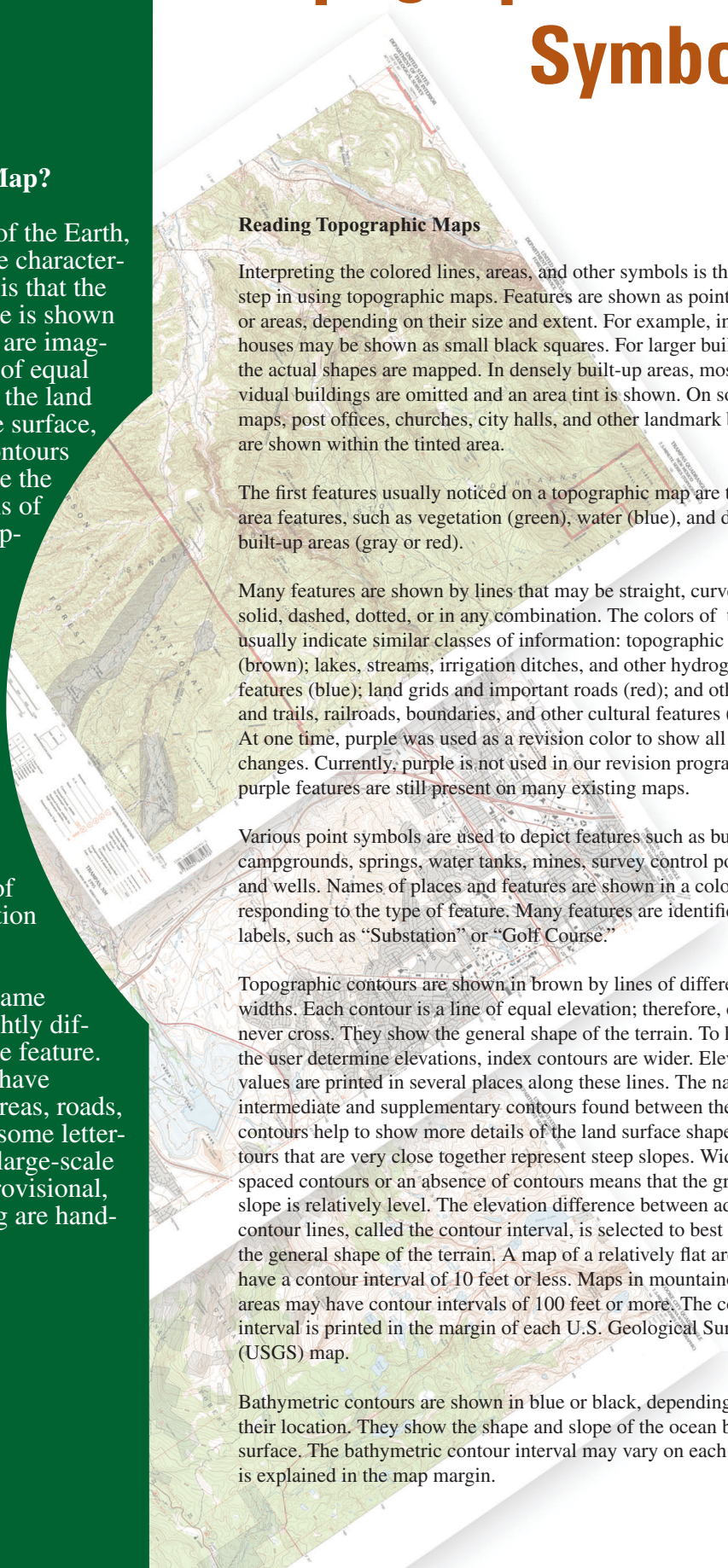
- 18a The canker is often found on oak trees and other hardwoods, it can appear smooth black or grey Hypoxylon canker
- 18b Canker is not described as above go to 19
- 19a The canker is found on pine and is associated with a lot of resin or pitch production by the tree Pitch canker
- 19b The disease is caused by a conk or shelf fungus on the stems of hardwood trees, when fresh the fungus is brown but turns black and breaks off the tree over time, is associated with hollow trees Hispidus canker
- 20a The disease has two different host plants from two different tree species go to 21
- 20b Not as described above go to 22
- 21a The two hosts are red cedar/Juniper (*Juniperus virginiana*) and apples or crabapple (*Malus* species), on the cedar it produces large round galls and on the apple causes orange leaf spots Cedar apple rust
- 21b The two hosts are pine (loblolly and slash, especially) and oak (water, willow, and laurel), the fungus causes galls to form on branches of the pine and leaf spots on the oak Fusiform rust
- 22a The fungus grows at the base of trees go to 23
- 22b Not as described above go to 24
- 23a The fungus grows at the base of a conifers, it grows as a conk or shelf-fungus, is brown with a white edge (margin) Annosus root rot
- 23b The fungus grows as clusters of mushrooms at the base of trees like a little “army”, it can also grow rhizomorphs that look like black-brown shoestrings Armillaria root rot
- 24a The disease is found on the leaves or needles of the host plant go to 25
- 24b The disease is a vascular wilt of redbay, swamp bay, avocado, it is caused by a fungus that is moved around by a beetle, symptoms include wilting and discoloration or streaking under the bark in the vascular tissue Laurel wilt
- 25a The disease is caused by a bacterium, symptoms appear on the leaves of hardwoods, like oak, at can look like drought stress, the edge (margin) of the leaves become dead and brown (necrotic) sometimes with a yellow halo between the dead tissue and live Bacterial leaf scorch
- 25b Not as above go to 26

- 26a The fungus infects the needles of pine trees and causes them to turn red-brown and be prematurely dropped from the tree Needlecast
- 26b Not as described above go to 27
- 27a The disease is caused by a fungus that grows on the upper surface of leaves, it looks like white fluff Powdery mildew
- 27b Not as described above go to 28
- 28a The disease is found on sycamore trees, it causes dead areas (necrosis) of leaves in a delta-shape along the veins, and causes cankers of the branches, the cankers result in witch's brooms Sycamore anthracnose
- 28b Not as described above go to 29
- 29a The fungus infects leaves of oak trees causing raised bumps on the leaves that appear a lighter shade of green..... Oak leaf blister
- 29b The fungus grows on the upper surface of maples and hollies, appears as black splotches on the leaves that are raised from the leaf tissue, are leathery to the touch Tar spot
- 30a The damage are V-shaped grooves cut into the bark of trees, it was caused by humans during the collection of pine resin from trees to make turpentine, is sometimes associated with metal attached to the tree..... Catface
- 30b Not as described above go to 31
- 31a The damage appears as an overgrowth of tissue that can be round, oval, or elongated, they can appear on branches, stems, or leaves, and can be cause by insects, diseases, or abiotic factors..... Galls
- 31b Not as described above go to 32
- 32a Damage looks like vertical slashes in the tree's bark and is caused by giant sparks of electricity Lightning
- 32b Not as above go to 33
- 33a The damage looks like a green plant growing on the branches of its host tree, it does not lose its leaves in the winter, is a higher parasitic plant Mistletoe
- 33b An abnormal overgrowth of twigs or branches growing from one area, often associated with branch damage (insect, disease, pruning), the tree overgrows to compensate for the loss of branches and leaves Witch's broom

Florida 4-H Forest Ecology Contest

Map & Compass Study Resources

Topographic Map Symbols



What is a Topographic Map?

A map is a representation of the Earth, or part of it. The distinctive characteristic of a topographic map is that the shape of the Earth's surface is shown by contour lines. Contours are imaginary lines that join points of equal elevation on the surface of the land above or below a reference surface, such as mean sea level. Contours make it possible to measure the height of mountains, depths of the ocean bottom, and steepness of slopes.

A topographic map shows more than contours. The map includes symbols that represent such features as streets, buildings, streams, and vegetation. These symbols are constantly refined to better relate to the features they represent, improve the appearance or readability of the map, or reduce production cost.

Consequently, within the same series, maps may have slightly different symbols for the same feature. Examples of symbols that have changed include built-up areas, roads, intermittent drainage, and some lettering styles. On one type of large-scale topographic map, called provisional, some symbols and lettering are hand-drawn.

Reading Topographic Maps

Interpreting the colored lines, areas, and other symbols is the first step in using topographic maps. Features are shown as points, lines, or areas, depending on their size and extent. For example, individual houses may be shown as small black squares. For larger buildings, the actual shapes are mapped. In densely built-up areas, most individual buildings are omitted and an area tint is shown. On some maps, post offices, churches, city halls, and other landmark buildings are shown within the tinted area.

The first features usually noticed on a topographic map are the area features, such as vegetation (green), water (blue), and densely built-up areas (gray or red).


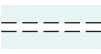

Many features are shown by lines that may be straight, curved, solid, dashed, dotted, or in any combination. The colors of the lines usually indicate similar classes of information: topographic contours (brown); lakes, streams, irrigation ditches, and other hydrographic features (blue); land grids and important roads (red); and other roads and trails, railroads, boundaries, and other cultural features (black). At one time, purple was used as a revision color to show all feature changes. Currently, purple is not used in our revision program, but purple features are still present on many existing maps.

Various point symbols are used to depict features such as buildings, campgrounds, springs, water tanks, mines, survey control points, and wells. Names of places and features are shown in a color corresponding to the type of feature. Many features are identified by labels, such as "Substation" or "Golf Course."












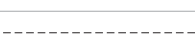

Topographic contours are shown in brown by lines of different widths. Each contour is a line of equal elevation; therefore, contours never cross. They show the general shape of the terrain. To help the user determine elevations, index contours are wider. Elevation values are printed in several places along these lines. The narrower intermediate and supplementary contours found between the index contours help to show more details of the land surface shape. Contours that are very close together represent steep slopes. Widely spaced contours or an absence of contours means that the ground slope is relatively level. The elevation difference between adjacent contour lines, called the contour interval, is selected to best show the general shape of the terrain. A map of a relatively flat area may have a contour interval of 10 feet or less. Maps in mountainous areas may have contour intervals of 100 feet or more. The contour interval is printed in the margin of each U.S. Geological Survey (USGS) map.

Bathymetric contours are shown in blue or black, depending on their location. They show the shape and slope of the ocean bottom surface. The bathymetric contour interval may vary on each map and is explained in the map margin.









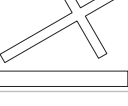
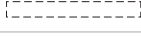


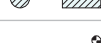







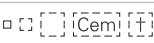
BATHYMETRIC FEATURES

Area exposed at mean low tide; sounding datum line***	
Channel***	
Sunken rock***	










BOUNDARIES

National	
State or territorial	
County or equivalent	
Civil township or equivalent	
Incorporated city or equivalent	
Federally administered park, reservation, or monument (external)	
Federally administered park, reservation, or monument (internal)	
State forest, park, reservation, or monument and large county park	
Forest Service administrative area*	
Forest Service ranger district*	
National Forest System land status, Forest Service lands*	
National Forest System land status, non-Forest Service lands*	
Small park (county or city)	

BUILDINGS AND RELATED FEATURES








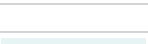

Building	
School; house of worship	
Athletic field	
Built-up area	
Forest headquarters*	
Ranger district office*	
Guard station or work center*	
Racetrack or raceway	
Airport, paved landing strip, runway, taxiway, or apron	
Unpaved landing strip	
Well (other than water), windmill or wind generator	
Tanks	
Covered reservoir	
Gaging station	
Located or landmark object (feature as labeled)	
Boat ramp or boat access*	
Roadside park or rest area	
Picnic area	
Campground	
Winter recreation area*	
Cemetery	

COASTAL FEATURES


Foreshore flat	
Coral or rock reef	
Rock, bare or awash; dangerous to navigation	
Group of rocks, bare or awash	
Exposed wreck	
Depth curve; sounding	
Breakwater, pier, jetty, or wharf	
Seawall	
Oil or gas well; platform	

CONTOURS





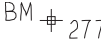










Topographic

Index	
Approximate or indefinite	
Intermediate	
Approximate or indefinite	
Supplementary	
Depression	
Cut	
Fill	
Continental divide	

Bathymetric

Index***	
Intermediate***	
Index primary***	
Primary***	
Supplementary***	

CONTROL DATA AND MONUMENTS

Principal point**	
U.S. mineral or location monument	
River mileage marker	
Boundary monument	
Third-order or better elevation, with tablet	 
Third-order or better elevation, recoverable mark, no tablet	
With number and elevation	
Horizontal control	
Third-order or better, permanent mark	 
With third-order or better elevation	 
With checked spot elevation	
Coincident with found section corner	 
Unmonumented**	

CONTROL DATA AND MONUMENTS – *continued*

Vertical control

Third-order or better elevation, with tablet	BM × 5280
Third-order or better elevation, recoverable mark, no tablet	× 528
Bench mark coincident with found section corner	BM + 5280
Spot elevation	× 7523

GLACIERS AND PERMANENT SNOWFIELDS

Contours and limits	
Formlines	
Glacial advance	
Glacial retreat	

LAND SURVEYS

Public land survey system

Range or Township line	—————
Location approximate	- - - - -
Location doubtful	- · - · -
Protracted	- · - · - · - · -
Protracted (AK 1:63,360-scale)	—————
Range or Township labels	R1E T2N R3W T4S
Section line	—————
Location approximate	- - - - -
Location doubtful	- · - · -
Protracted	- · - · - · - · -
Protracted (AK 1:63,360-scale)	—————
Section numbers	1 - 36 1 - 36
Found section corner	+
Found closing corner	+
Witness corner	WC
Meander corner	MC
Weak corner*	+

Other land surveys

Range or Township line	·····
Section line	·····
Land grant, mining claim, donation land claim, or tract	— · — · — · — · —
Land grant, homestead, mineral, or other special survey monument	□
Fence or field lines	- - - - -

MARINE SHORELINES

Shoreline	
Apparent (edge of vegetation)***	
Indefinite or unsurveyed	

MINES AND CAVES

Quarry or open pit mine	×
Gravel, sand, clay, or borrow pit	×
Mine tunnel or cave entrance	←
Mine shaft	■
Prospect	x
Tailings	
Mine dump	
Former disposal site or mine	

PROJECTION AND GRIDS

Neatline	39°15' 90°37'30"
Graticule tick	— 55'
Graticule intersection	+
Datum shift tick	— — —

State plane coordinate systems

Primary zone tick	— 640 000 FEET
Secondary zone tick	— 247 500 METERS
Tertiary zone tick	— 260 000 FEET
Quaternary zone tick	— 98 500 METERS
Quintary zone tick	— 320 000 FEET

Universal transverse metcator grid

UTM grid (full grid)	— 273
UTM grid ticks*	— 269

RAILROADS AND RELATED FEATURES

Standard gauge railroad, single track	— — —
Standard gauge railroad, multiple track	— — — — —
Narrow gauge railroad, single track	— — —
Narrow gauge railroad, multiple track	— — — — —
Railroad siding	— — —
Railroad in highway	— — —
Railroad in road	— — —
Railroad in light duty road*	— — —
Railroad underpass; overpass	— — —
Railroad bridge; drawbridge	— — —
Railroad tunnel	— — —
Railroad yard	
Railroad turntable; roundhouse	— — —

RIVERS, LAKES, AND CANALS

Perennial stream	
Perennial river	
Intermittent stream	
Intermittent river	
Disappearing stream	
Falls, small	
Falls, large	
Rapids, small	
Rapids, large	
Masonry dam	
Dam with lock	
Dam carrying road	

RIVERS, LAKES, AND CANALS – *continued*

Perennial lake/pond	
Intermittent lake/pond	
Dry lake/pond	
Narrow wash	
Wide wash	
Canal, flume, or aqueduct with lock	
Elevated aqueduct, flume, or conduit	
Aqueduct tunnel	
Water well, geyser, fumarole, or mud pot	
Spring or seep	

ROADS AND RELATED FEATURES

Please note: Roads on Provisional-edition maps are not classified as primary, secondary, or light duty. These roads are all classified as improved roads and are symbolized the same as light duty roads.

Primary highway	
Secondary highway	
Light duty road	
Light duty road, paved*	
Light duty road, gravel*	
Light duty road, dirt*	
Light duty road, unspecified*	
Unimproved road	
Unimproved road*	
4WD road	
4WD road*	
Trail	
Highway or road with median strip	
Highway or road under construction	
Highway or road underpass; overpass	
Highway or road bridge; drawbridge	
Highway or road tunnel	
Road block, berm, or barrier*	
Gate on road*	
Trailhead*	

SUBMERGED AREAS AND BOGS

Marsh or swamp	
Submerged marsh or swamp	
Wooded marsh or swamp	
Submerged wooded marsh or swamp	
Land subject to inundation	

SURFACE FEATURES

Levee	
Sand or mud	
Disturbed surface	
Gravel beach or glacial moraine	
Tailings pond	

TRANSMISSION LINES AND PIPELINES

Power transmission line; pole; tower	
Telephone line	
Aboveground pipeline	
Underground pipeline	

VEGETATION

Woodland	
Shrubland	
Orchard	
Vineyard	
Mangrove	

* USGS-USDA Forest Service Single-Edition Quadrangle maps only.

In August 1993, the U.S. Geological Survey and the U.S. Department of Agriculture's Forest Service signed an Interagency Agreement to begin a single-edition joint mapping program. This agreement established the coordination for producing and maintaining single-edition primary series topographic maps for quadrangles containing National Forest System lands. The joint mapping program eliminates duplication of effort by the agencies and results in a more frequent revision cycle for quadrangles containing National Forests. Maps are revised on the basis of jointly developed standards and contain normal features mapped by the USGS, as well as additional features required for efficient management of National Forest System lands. Single-edition maps look slightly different but meet the content, accuracy, and quality criteria of other USGS products.

** Provisional-Edition maps only.

Provisional-edition maps were established to expedite completion of the remaining large-scale topographic quadrangles of the conterminous United States. They contain essentially the same level of information as the standard series maps. This series can be easily recognized by the title "Provisional Edition" in the lower right-hand corner.

*** Topographic Bathymetric maps only.

Topographic Map Information

For more information about topographic maps produced by the USGS, please call: 1-888-ASK-USGS or visit us at <http://ask.usgs.gov/>

Map Symbols!

Can you find...

Draw it here!

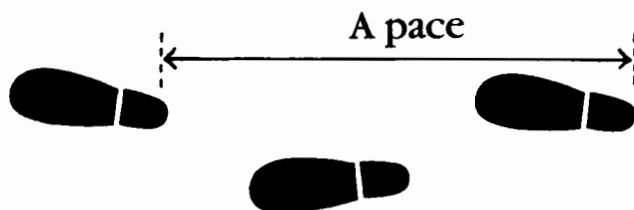
Railroad Track	
Marsh	
Forest	
Interstate (Primary) Highway	
Bridge	
House of Worship	
School	
Building – Shopping Mall	
Campground	
Cemetery	
Powerline	
Trail	
What is the elevation difference between two index contour lines?	
What is the elevation difference between two regular contour lines?	

Compass & PACING

by
Dr. Deborah B. Hill
Department of Forestry

Pacing is a simple means of measuring linear distance by walking. It can be used outdoors or indoors, in the woods or over land.

Pacing's measurement dates back to Roman times. The Roman pace, measured from the heel of the foot to the heel of the same foot in the next stretch, was about 58.1 inches. Today this is known as the geometric pace, which measures about 5 feet.



To make pacing work for you, you need to know how much distance your pace covers. You can determine this by walking a pre-measured course a few times and then checking the pacing chart below. A pace equals two normal steps, beginning and ending on your dominant foot.

A common use for pacing in forestry is to pace off 66 feet from a tree in order to get a measurement of tree height. This is why you determine your pace on a 66-foot course.

1. Begin by measuring a 66-foot course with a tape measure. You will use this distance to establish your pace accurately.
2. Pace off the course measured at Step #1. Repeat two or three times and compare results.
3. Look up the number of your paces on the chart below to determine how many linear feet each of your paces covered.

EX: If it takes you 24 paces to cover 66 feet, each of your paces is 2.75 feet.

4. When you need to go from one point to another and do not know how far it is, pace the distance. Record the number of paces and multiply your individual pace by the number of paces to get the answer.

EX: If it takes you 10 paces to cover an unknown distance, multiply your known pace (say, 4.26 feet) by 10 to get 42.6 feet.



P A C I N G C H A R T

# paces/ 66 feet	feet/ pace	# paces/ 66 feet	feet/ pace	# paces/ 66 feet	feet/ pace	# paces/ 66 feet	feet/ pace
10.0	6.60	14.5	4.55	19.0	3.47	23.5	2.81
10.5	6.28	15.0	4.40	19.5	3.38	24.0	2.75
11.0	6.00	15.5	4.26	20.0	3.30	24.5	2.70
11.5	5.74	16.0	4.13	20.5	3.22	25.0	2.64
12.0	5.50	16.5	4.00	21.0	3.14	25.5	2.59
12.5	5.28	17.0	3.88	21.5	3.07	26.0	2.54
13.0	5.08	17.5	3.77	22.0	3.00	26.5	2.49
13.5	4.89	18.0	3.67	22.5	2.93	27.0	2.44
14.0	4.71	18.5	3.57	23.0	2.87		

5. If you are given a specific distance to travel (say, 66 feet) between two points, divide your pace (say, 4 feet) into the distance you are given to figure out how many paces you need to get there (16.5 paces in this case.)

Competitions usually give you either the linear distance you need to travel between two points *or* two clearly visible points between which you have to pace the distance.

Compass

A compass tells you in what direction you are headed relative to magnetic north. You can combine use of a compass with your newly found knowledge of pacing to find your way across country (where there may not be any paths or roads) with the help of a topographic map that shows mountains, streams and other landmarks. Using a compass and pacing with a topographic map across country or through a forest is called *orienteering*.

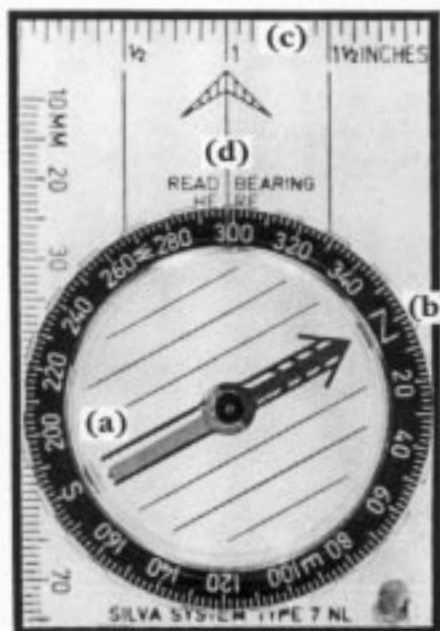
In order to use a compass successfully, you need to know: a) where magnetic north is; b) where you are in relation to where you want to be (e.g., is this area east of your home, or south?); and c) how to set the bearing for where you want to go.

The following will help you use a compass correctly to identify the direction in which you are headed.

1. The circular part of the unit is the compass itself and is measured in 360 degrees.
2. The red needle (the one that moves) always points to magnetic north.
3. Each small mark on the rim of the compass is 2 degrees.
4. Each large mark on the rim of the compass is 10 degrees.
5. The inches or millimeters marked on the edge of the compass help you use the *scale* on a map to tell how far it is between two points.
6. The hole in the corner of the compass is for a string so you can carry it around your neck.

Using the Compass

1. Turn the rim of the compass until the moving needle lies between the arrow marks drawn on the bottom of the compass. (a)
2. Make sure the red end of the needle points to the "N" on the rim. (b)
3. Always have the front of the compass (the inch ruler edge) pointed in the direction you are heading. (c)
4. Hold the compass level (parallel to the ground) so the needle can float freely in the liquid inside the circle.
5. Turn your body to face squarely in the direction you are headed. Hold the compass close to your body at about chest level so that you can look down on it and read it easily.
6. Read compass bearing (direction you are heading) at the front of the compass where it says "read bearing here." (d)
7. Determine the correct number of degrees where the solid line crosses the compass rim.
8. Making sure your compass is sighted on the point you are headed toward, walk in a straight line toward that objective.



Educational programs of the Kentucky Cooperative Extension Service serve all people regardless of race, color, age, sex, religion, handicap, or national origin.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, C. Oran Little, Director of Cooperative Extension Service, University of Kentucky College of Agriculture, Lexington, and Kentucky State University, Frankfort.

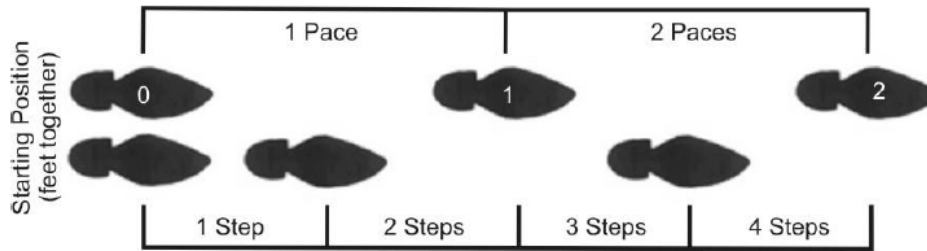
Advanced Level Compass Worksheet

Vocabulary:

Pace – An average unit of length consisting of two normal walking steps.

Pace Count – The number of times one foot (using either your left or right foot) touches the ground over a given distance.

Average Pace Count – The sum of Pace Count #1 and Pace Count #2 divided by two.



Determining Your Pace:

To determine your Pace, you must first determine your Pace Count. First, measure 100 feet and walk this distance. As you walk, count the number of times one of your feet hits the ground. If your first step is with your **right** foot, count the number of times your **left** foot touches the ground. If your first step is with your **left** foot, count the number of times that your **right** foot touches the ground.

Step 1: Your Pace may vary slightly, so try it twice to get your Average Pace Count. For Pace Count #1, walk 100 feet and count the number of times your right (or left foot) touches the ground. Do the same for Pace Count #2. Add Pace Count #1 and Pace Count #2 together. Then divide the sum of Pace Count #1 and Pace Count #2 by two to get your Average Pace Count.

Pace Count #1 = _____ paces per 100 feet

Pace Count #2 = _____ paces per 100 feet

$$\frac{\text{Pace Count \#1}}{\text{Pace Count \#1}} + \frac{\text{Pace Count \#2}}{\text{Pace Count \#2}} = \frac{\text{Total}}{\text{Total}} \div 2 = \frac{\text{Average Pace Count}}{\text{Average Pace Count}}$$

Step 2: Divide 100 feet by your Average Pace Count to get your Pace.

$$100 \text{ feet} \div \frac{\text{Average Pace Count}}{\text{Average Pace Count}} = \frac{\text{Pace (ft)}}{\text{Pace (ft)}}$$

Calculating a Distance

Your Pace can be used to calculate the distance between two points. To do this, count the number of paces it takes you to walk from point A to point B. Write that number on the line below where it says "number of paces." You already calculated your pace on the previous page. Write that number on the line for "pace." This number will be the same for all the calculations on this page. The only thing that will change is the number of paces you count for each distance.

Finding a Bearing

To find your bearing, stand in front of the sign for point A and point your direction of travel arrow to point B. Turn your dial, so that the magnetic arrow is pointing North, or "red Fred is in the red shed." This number is your bearing. This example shows a bearing of approximately 143° (each line represents 5°).

Write your bearing in the space provided for each set of points. This number will be different for each set of points.



1. The distance from A to B is: _____ x _____ = _____
Number of Paces Pace (ft) Feet

The bearing from A to B is: _____

2. The distance from B to C is: _____ x _____ = _____
Number of Paces Pace (ft) Feet

The bearing from B to C is: _____

3. The distance from C to D is: _____ x _____ = _____
Number of Paces Pace (ft) Feet

The bearing from C to D is: _____

4. The distance from D to E is: _____ x _____ = _____
Number of Paces Pace (ft) Feet

The bearing from D to E is: _____

Pacing and Navigating

(one pace is every time one foot hits the ground = 2 steps)

The first time, I count _____ paces to walk 100 feet.

$$100 \text{ feet} \div \text{_____ paces} = \text{_____ (1) feet per pace}$$

The second time, I count _____ paces to walk 100 feet.

$$100 \text{ feet} \div \text{_____ paces} = \text{_____ (2) feet per pace}$$

The third time, I count _____ paces to walk 100 feet.

$$100 \text{ feet} \div \text{_____ paces} = \text{_____ (3) feet per pace}$$

Take the average of your three times pacing:

$$\text{_____ (1)} + \text{_____ (2)} + \text{_____ (3)} \div 3 = \text{_____ feet per pace}$$

My pace is _____ feet. **REMEMBER THIS NUMBER!**

Distance = your pace in feet \times the number of paces you count from A to B

From Point A to Point B is _____ paces \times _____ = _____ feet

From Point B to Point C is _____ paces \times _____ = _____ feet

From Point C to Point D is _____ paces \times _____ = _____ feet

From Point D to Point E is _____ paces \times _____ = _____ feet

**FLORIDA 4-H FOREST ECOLOGY CONTEST
SAMPLE CONTEST SCORESHEETS**

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Instructions: You will be identifying 15 tree samples. For each tree sample (labeled A through O), find the correct species in the list below and then write the number of the species in the space next to the appropriate letter.

Junior - Tree ID

BADGE NUMBER: _____

TOTAL SCORE: _____ / 15

#	Common Name	Scientific Name
1	American holly	<i>Ilex opaca</i> var. <i>opaca</i>
2	American sycamore	<i>Platanus occidentalis</i>
3	bald cypress	<i>Taxodium distichum</i>
4	eastern redcedar	<i>Juniperus virginiana</i>
5	flowering dogwood	<i>Cornus florida</i>
6	laurel oak	<i>Quercus laurifolia</i>
7	live oak	<i>Quercus virginiana</i>
8	loblolly pine	<i>Pinus taeda</i>
9	longleaf pine	<i>Pinus palustris</i>
10	melaleuca	<i>Melaleuca quinquenervia</i>
11	pecan	<i>Carya illinoensis</i>
12	pignut hickory	<i>Carya glabra</i>
13	red maple	<i>Acer rubrum</i>
14	sassafras	<i>Sassafras albidum</i>
15	southern magnolia	<i>Magnolia grandiflora</i>
16	sweetgum	<i>Liquidambar styraciflua</i>
17	tuliptree	<i>Liriodendron tulipifera</i>
18	turkey oak	<i>Quercus laevis</i>
19	water oak	<i>Quercus nigra</i>
20	waxmyrtle	<i>Myrica cerifera</i>

A. _____ I. _____

B. _____ J. _____

C. _____ K. _____

D. _____ L. _____

E. _____ M. _____

F. _____ N. _____

G. _____ O. _____

H. _____

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Instructions: You will be identifying 15 insect, disease, and stress samples. For each sample (labeled A through O), find the correct identification in the list below and then write the number in the space next to the appropriate letter.

Junior – Forest Health
BADGE NUMBER: _____
TOTAL SCORE: _____ / 15

Insects

1. Ambrosia beetle
2. Black turpentine beetle
3. Cicadas
4. Eastern tent caterpillar
5. Fall webworm
6. Southern pine beetle

A. _____ I. _____

B. _____ J. _____

C. _____ K. _____

D. _____ L. _____

E. _____ M. _____

F. _____ N. _____

G. _____ O. _____

H. _____

Diseases

7. Armillaria root rot
8. Cedar-apple rust
9. Fusiform rust
10. Hypoxylon canker
11. Needlecast
12. Pitch canker

Stresses

13. Catface
14. Lightning
15. Mistletoe

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Mammals

1. Armadillo
2. Black bear
3. Bobcat
4. Cottontail rabbit
5. Florida panther
6. Gray squirrel
7. Opossum
8. Pocket gopher
9. Raccoon
10. Red fox
11. Sherman's fox squirrel
12. Striped skunk
13. White-tailed deer
14. Wild pig

Reptiles

15. American alligator
16. Black racer
17. Coral snake
18. Cottonmouth
19. Cuban brown anole
20. Eastern box turtle
21. Eastern diamondback rattlesnake
22. Eastern indigo snake
23. Fence lizard
24. Five-lined ground skink
25. Gopher tortoise
26. Green anole
27. Pygmy rattlesnake
28. Yellow rat snake

Amphibians

29. Cuban treefrog
30. Eastern narrowmouth toad
31. Eastern newt
32. Green treefrog
33. Southern leopard frog
34. Southern toad

Birds

35. American crow
36. Barred owl
37. Blue jay
38. Carolina chickadee
39. Chuck-will's-widow
40. Eastern towhee
41. Florida scrub jay
42. Northern bobwhite
43. Northern mockingbird
44. Pileated woodpecker
45. Red-bellied woodpecker
46. Red-cockaded woodpecker
47. Red-shouldered hawk
48. Sharp-shinned hawk
49. Tufted titmouse
50. Turkey vulture
51. Wild turkey
52. Wood duck
53. Wood stork

Junior – Wildlife ID	
BADGE NUMBER: _____	
TOTAL SCORE: _____ / 20	

- | | |
|----------|----------|
| A. _____ | K. _____ |
| B. _____ | L. _____ |
| C. _____ | M. _____ |
| D. _____ | N. _____ |
| E. _____ | O. _____ |
| F. _____ | P. _____ |
| G. _____ | Q. _____ |
| H. _____ | R. _____ |
| I. _____ | S. _____ |
| J. _____ | T. _____ |

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Junior – Forest Ecosystems
BADGE NUMBER: _____
TOTAL SCORE: _____ / 20

Tropical Hammocks

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Freshwater Swamps

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Junior – Map Symbols
BADGE NUMBER: _____
TOTAL SCORE: _____ / 20

Please provide the correct answer (A, B, C, or D) to each of the ten questions displayed on the table.

2 points for each correct answer.

1. _____

6. _____

2. _____

7. _____

3. _____

8. _____

4. _____

9. _____

5. _____

10. _____

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Instructions: You will be identifying 20 tree samples. For each tree sample (labeled A through T), find the correct species in the list below and then write the number of the species in the space next to the appropriate letter.

Intermediate – Tree ID
BADGE NUMBER: _____
TOTAL SCORE: _____ / 20

#	Common Name	Scientific Name
1	American elm	<i>Ulmus americana</i>
2	American holly	<i>Ilex opaca</i> var. <i>opaca</i>
3	American sycamore	<i>Platanus occidentalis</i>
4	bald cypress	<i>Taxodium distichum</i>
5	black cherry	<i>Prunus serotina</i>
6	black walnut	<i>Juglans nigra</i>
7	boxelder	<i>Acer negundo</i>
8	Chinese tallow	<i>Triadica sebifera</i>
9	common persimmon	<i>Diospyros virginiana</i>
10	eastern redcedar	<i>Juniperus virginiana</i>
11	flowering dogwood	<i>Cornus florida</i>
12	laurel oak	<i>Quercus laurifolia</i>
13	live oak	<i>Quercus virginiana</i>
14	loblolly pine	<i>Pinus taeda</i>
15	longleaf pine	<i>Pinus palustris</i>
16	melaleuca	<i>Melaleuca quinquenervia</i>
17	pecan	<i>Carya illinoensis</i>
18	pignut hickory	<i>Carya glabra</i>
19	red maple	<i>Acer rubrum</i>
20	sassafras	<i>Sassafras albidum</i>
21	slash pine	<i>Pinus elliottii</i>
22	southern magnolia	<i>Magnolia grandiflora</i>
23	southern red oak	<i>Quercus falcata</i>
24	sweetgum	<i>Liquidambar styraciflua</i>
25	tuliptree	<i>Liriodendron tulipifera</i>
26	turkey oak	<i>Quercus laevis</i>
27	water oak	<i>Quercus nigra</i>
28	waxmyrtle	<i>Myrica cerifera</i>

- | | |
|----------|----------|
| A. _____ | K. _____ |
| B. _____ | L. _____ |
| C. _____ | M. _____ |
| D. _____ | N. _____ |
| E. _____ | O. _____ |
| F. _____ | P. _____ |
| G. _____ | Q. _____ |
| H. _____ | R. _____ |
| I. _____ | S. _____ |
| J. _____ | T. _____ |

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Instructions: You will be identifying 20 insect, disease, and stress samples. For each sample (labeled A through T), find the correct identification in the list below and then write the number in the space next to the appropriate letter.

Intermediate - Forest Health

BADGE NUMBER: _____

TOTAL SCORE: _____ / 20

Insects

- | | |
|-----------------------------|----------------------|
| 1. Ambrosia beetle | 13. Cedar-apple rust |
| 2. Black turpentine beetle | 14. Fireblight |
| 3. Cicadas | 15. Fusiform rust |
| 4. Eastern tent caterpillar | 16. Hypoxylon canker |
| 5. Fall webworm | 17. Needlecast |
| 6. Ips beetle | 18. Oak leaf blister |
| 7. Pine sawflies | 19. Pitch canker |
| 8. Pine tip moth | |
| 9. Pine webworm | |
| 10. Southern pine beetle | |

Stresses

20. Catface
21. Galls
22. Lightning
23. Mistletoe

Diseases

11. Annosus root rot
12. Armillaria root rot

A. _____ K. _____

B. _____ L. _____

C. _____ M. _____

D. _____ N. _____

E. _____ O. _____

F. _____ P. _____

G. _____ Q. _____

H. _____ R. _____

I. _____ S. _____

J. _____ T. _____

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Mammals

1. Armadillo
2. Black bear
3. Bobcat
4. Cottontail rabbit
5. Florida panther
6. Gray squirrel
7. Opossum
8. Pocket gopher
9. Raccoon
10. Red fox
11. Sherman's fox squirrel
12. Striped skunk
13. White-tailed deer
14. Wild pig

Reptiles

15. American alligator
16. Black racer
17. Coral snake
18. Cottonmouth
19. Cuban brown anole
20. Eastern box turtle
21. Eastern diamondback rattlesnake
22. Eastern indigo snake
23. Fence lizard
24. Five-lined ground skink
25. Gopher tortoise
26. Green anole
27. Pygmy rattlesnake
28. Yellow rat snake

Amphibians

29. Cuban treefrog
30. Eastern narrowmouth toad
31. Eastern newt
32. Green treefrog
33. Southern leopard frog
34. Southern toad

Birds

35. American crow
36. Barred owl
37. Blue jay
38. Carolina chickadee
39. Chuck-will's-widow
40. Eastern towhee
41. Florida scrub jay
42. Northern bobwhite
43. Northern mockingbird
44. Pileated woodpecker
45. Red-bellied woodpecker
46. Red-cockaded woodpecker
47. Red-shouldered hawk
48. Sharp-shinned hawk
49. Tufted titmouse
50. Turkey vulture
51. Wild turkey
52. Wood duck
53. Wood stork

Intermediate - Wildlife Hike

BADGE NUMBER: _____

TOTAL SCORE: _____ / 20

- | | |
|----------|----------|
| A. _____ | K. _____ |
| B. _____ | L. _____ |
| C. _____ | M. _____ |
| D. _____ | N. _____ |
| E. _____ | O. _____ |
| F. _____ | P. _____ |
| G. _____ | Q. _____ |
| H. _____ | R. _____ |
| I. _____ | S. _____ |
| J. _____ | T. _____ |

**Intermediate -
Forest Ecosystems**

BADGE NUMBER: _____

TOTAL SCORE: _____ / 20

Tropical Hammocks

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Freshwater Swamps

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Intermediate - Map & Compass
BADGE NUMBER: _____
TOTAL SCORE: _____ / 20

Map Symbols

Please provide the correct answer (A, B, C, or D) to each of the ten questions displayed on the table.

1 point for each correct answer.

- | | |
|----------|-----------|
| 1. _____ | 6. _____ |
| 2. _____ | 7. _____ |
| 3. _____ | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

<i>Do not write in the scoring box.</i>
SCORE
Map symbols subtotal: _____ (0-10)
Degrees subtotal: _____ (0-5)
Distance subtotal: _____ (0-5)
TOTAL: _____ (out of 20)

Compass

Please provide the correct bearing and distance in feet as listed below.

Full points (5) for each bearing if answers are within 3 degrees or feet. One point off for each additional 3 degrees or feet in error.

1. To get from Point A to Point B you need to travel at a bearing of _____ degrees.
2. To get from Point C to Point D you need to travel _____ feet.

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Instructions: This station has 30 tree samples. For each sample (labeled A through DD), identify the plant material and then write the common name in the space next to the appropriate letter.

Please print neatly and be sure your answer is legible. Common names must be the ones used on the Florida 4-H Forest Ecology website and must be complete. (E.g., "maple" is not a correct answer for "red maple.") Minor spelling errors (including capitalization) will result in ½ point deduction per tree.

Senior – Tree ID
BADGE NUMBER: _____
TOTAL SCORE: _____ / 30

A. _____

P. _____

B. _____

Q. _____

C. _____

R. _____

D. _____

S. _____

E. _____

T. _____

F. _____

U. _____

G. _____

V. _____

H. _____

W. _____

I. _____

X. _____

J. _____

Y. _____

K. _____

Z. _____

L. _____

AA. _____

M. _____

BB. _____

N. _____

CC. _____

O. _____

DD. _____

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Instructions: You will be identifying 30 insect, disease, and stress samples. For each sample (labeled A through DD), find the correct identification in the list below and then write the number in the space next to the appropriate letter.

Senior – Forest Health
BADGE NUMBER: _____
TOTAL SCORE: _____ / 30

Insects

1. Ambrosia beetle
2. Black turpentine beetle
3. Cicadas
4. Cottonwood leaf beetle
5. Cypress twig gall midge
6. Eastern tent caterpillar
7. Fall webworm
8. Ips beetle
9. Pine sawflies
10. Pine tip moth
11. Pine webworm
12. Scale insects
13. Southern pine beetle
14. Sycamore lacebug
15. Twig girdler

19. Cedar-apple rust
20. Fireblight
21. Fusiform rust
22. Hispidus canker
23. Hypoxylon canker
24. Laurel wilt
25. Needlecast
26. Oak leaf blister
27. Pitch canker
28. Powdery mildew
29. Sycamore anthracnose
30. Tar spot

Stresses

31. Catface
32. Galls
33. Lightning
34. Mistletoe
35. Witches'-broom

Diseases

16. Annosus root rot
17. Armillaria root rot
18. Bacterial leaf scorch

- | | |
|----------|-----------|
| A. _____ | P. _____ |
| B. _____ | Q. _____ |
| C. _____ | R. _____ |
| D. _____ | S. _____ |
| E. _____ | T. _____ |
| F. _____ | U. _____ |
| G. _____ | V. _____ |
| H. _____ | W. _____ |
| I. _____ | X. _____ |
| J. _____ | Y. _____ |
| K. _____ | Z. _____ |
| L. _____ | AA. _____ |
| M. _____ | BB. _____ |
| N. _____ | CC. _____ |
| O. _____ | DD. _____ |

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Senior – Map & Compass
BADGE NUMBER: _____
TOTAL SCORE: _____ / 22

Map Symbols

Please provide the correct answer (A, B, C, or D) to each of the five questions displayed on the table.
2 points for each correct answer.

1. _____
2. _____
3. _____
4. _____
5. _____

<i>Do not write in the scoring box.</i>		
SCORE		
Map symbols subtotal: _____ (0-10)		
Line	Bearing (2)	Distance (2)
A-B	_____	_____
B-C	_____	_____
C-A	_____	_____
Compass subtotal: _____ (0-12)		
TOTAL: _____ (out of 22)		

Compass

Please provide the correct bearing and distance in feet between each pair of points.

12 points possible (4 points per line: 2 points bearing, 2 points distance).
½ point taken off for each increment of 4 degrees or 3 feet in error.

Line	Bearing	Distance
A-B	_____	_____
B-C	_____	_____
C-A	_____	_____

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Senior – Forest Management
BADGE NUMBER: _____
TOTAL SCORE: _____ / 20

1. _____

11. _____

2. _____

12. _____

3. _____

13. _____

4. _____

14. _____

5. _____

15. _____

6. _____

16. _____

7. _____

17. _____

8. _____

18. _____

9. _____

19. _____

10. _____

20. _____

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Instructions: You will measure 4 standing trees and fill out the table below. For each tree, identify the species and estimate the diameter and merchantable height. Diameter at Breast Height (DBH) should be measured and recorded in even 2-inch diameter classes. Height should be measured in 16-foot logs to the nearest full half-log. Merchantable height should be measured from stump height to either an 8-inch top diameter, a major fork, or a serious defect that affects more than half the tree's diameter at that point.

In addition, you will determine the total volume in the plot and the volume per acre. Ten points will be allowed for the correct volume per acre. The plot acreage and tree volumes can be found in the table below. Remember, the total volume in the plot must be multiplied by a factor (20 for a 1/20-acre plot, 10 for a 1/10-acre plot, 5 for a 1/5-acre plot and 4 for a 1/4-acre plot) to determine the volume per acre. Point allocation will be 10 points for $\pm 5\%$ of the official volume, 8 points for $\pm 10\%$, 6 points for $\pm 15\%$, and no points over $\pm 15\%$.

The tree measurement volume table is provided on the back of this scoresheet.

Senior – Tree Measurement
BADGE NUMBER: _____
TOTAL SCORE: _____ / 30

Tree #	Species (1 pt)	DBH (2 pts)	Height (2 pts)	Volume	Score
1					
2					
3					
4					
	Total board foot volume in plot				
	Total board foot volume per acre				
a. Subtotal of tree scores (20 points possible)					
b. Score for volume per acre (10 points possible)					
TOTAL score (a + b)					

Plot size: _____

FLORIDA 4-H FOREST ECOLOGY CONTEST SCORESHEETS

Tree Measurement Volume Table

International ¼ inch Log Rule -- Form Class 78

VOLUME (board feet) BY NUMBER OF 16-FOOT LOGS

DBH	HEIGHT (NUMBER OF 16-FOOT LOGS)								
	1	1½	2	2½	3	3½	4	4½	5
10	36	48	59	66	73	-----	-----	-----	-----
12	56	74	92	106	120	128	137	-----	-----
14	78	105	132	153	174	187	200	-----	-----
16	106	143	180	210	241	263	285	-----	-----
18	136	184	233	274	314	344	374	-----	-----
20	171	234	296	348	401	440	480	511	542
22	211	290	368	434	500	552	603	647	691
24	251	346	441	523	605	664	723	782	840
26	299	414	528	626	725	801	877	949	1,021
28	347	482	616	733	850	938	1,027	1,114	1,201
30	403	560	718	854	991	1,094	1,198	1,306	1,415
32	462	644	826	988	1,149	1,274	1,400	1,518	1,637
34	521	728	934	1,119	1,304	1,447	1,590	1,727	1,864
36	589	826	1,063	1,274	1,485	1,650	1,814	1,974	2,135
38	656	921	1,186	1,428	1,670	1,854	2,038	2,224	2,410
40	731	1,030	1,329	1,598	1,868	2,081	2,294	2,494	2,693

Florida 4-H Nature Poetry Contest

The Florida 4-H Nature Poetry Contest is an annual contest. This is a chance for participants to demonstrate their creative talents! We invite contestants to compose and share an original poem related to Florida's natural world.

Who may enter?

The contest is open to youth in Florida. There is a limit of one entry per person. Up to 20 poems may be submitted from each county. **Entries must be postmarked by March 1.**

What types of poetry may be submitted?

The poems do not need to follow any particular format. Participants are encouraged to write about whatever personally engages them in nature. Please see the website for more information:

<https://programs.ifas.ufl.edu/florida-4-h-forest-ecology/nature-poetry-contest/>

Judging criteria:

Entries will be evaluated on the following criteria by a panel of poets, creative writers, environmental educators, and 4-H educators.

1. Original thought and perspective.
2. Relevance to Florida nature.
3. Word choice that powerfully conveys imagery and effectively conveys the subject.
4. Rhythm, pattern, rhyme, metaphor, and/or analogy as relevant to the type of poem

Winners:

Winners (1st, 2nd, and 3rd place in each of three age groups – Junior, Intermediate, and Senior) will be announced at the Forest Ecology Contest held in Gainesville. Winners will receive ribbons and their poems will be published on the contest website.

How to enter:

- Download the Nature Poetry Contest Entry Form at: <https://programs.ifas.ufl.edu/florida-4-h-forest-ecology/nature-poetry-contest/>
- The form can be filled out in Acrobat Reader and then printed or it can be printed and then filled out by hand. Either way, please sign the printed paper copy and mail both pages to the address at the bottom of this page. Both pages of the form need to be completed for each entry.
- Do not put any identifying information on the second page (where your poem is).
- Entries must be postmarked by March 1.
- All entries become the property of the University of Florida and will not be returned.

Questions? Email Elise Cassie: ecassie@ufl.edu