

# FORESTRY

## Studying for the Envirothon



# Use Your Resources

This study guide does not replace the online forestry guides found at:

- [http://irlenvirothon.net/forestry\\_resources.html](http://irlenvirothon.net/forestry_resources.html)

# Use the Study Guide and pay attention to its visual cues

If text is **bold**, underlined, and *italicized*,  
it's fair game for the test!

**Crown** - The *crown* is the site of active food making and growth. Leaves are the main component of the crown and are responsible for manufacturing the tree's food. This process is called *photosynthesis*. Photosynthesis is a chemical process that utilizes energy from the sun and converts water, minerals, and carbon dioxide into sugars.

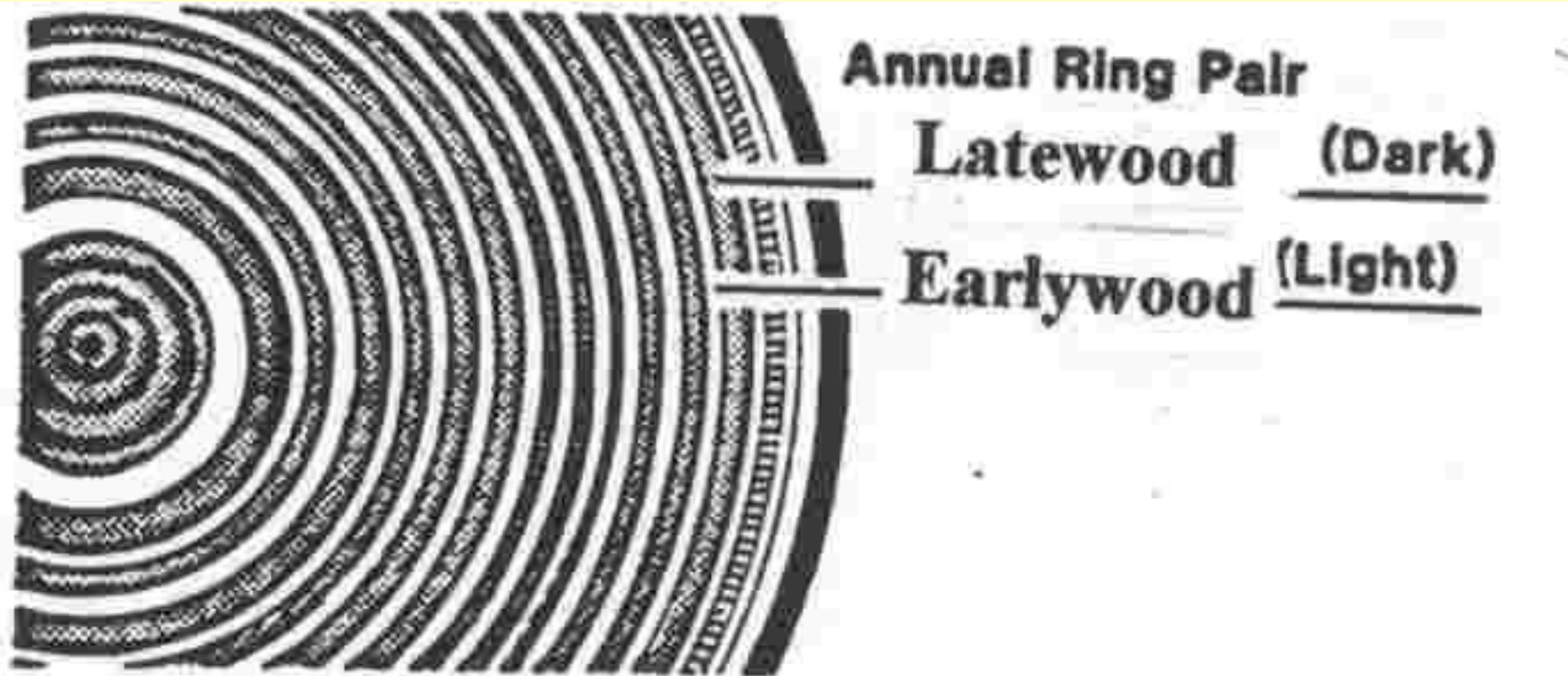
# Dendrology - Tree Identification

Below is a short example of a dichotomous key. Refer to the study guide for the key that may be used in the test. Students are expected to use the key to identify tree samples or photographs of trees.

## Hardwood Key

1. Leaves and twigs are opposite\_\_\_\_\_2
1. Leaves and twigs are alternate\_\_\_\_\_3
2. Leaves are compound and 7-12 inches long; 5-7  
leaflets per leaf \_\_\_\_\_**CAROLINA ASH (*Fraxinus caroliniana*)**
2. Leaves are simple\_\_\_\_\_11
3. Leaves are lobed\_\_\_\_\_4
3. Leaves are unlobed\_\_\_\_\_6
4. Lobes on leaves are V-shaped\_\_\_\_\_5
4. Lobes on leaves are U-shaped, toothed leaf  
margins\_\_\_\_\_**RED MULBERRY (*Morus rubra*)**
5. Leaves 3-5 lobes, 4-9 inches long and broad, light green and  
smooth above and paler below **SYCAMORE (*Platanus occidentalis*)**
5. Leaves star-shaped, 5-7 lobes\_ **SWEET GUM (*Liquidambar stryaciflua*)**

# Determining a tree's age



# Timber Volume Determination

**Gross Tree Volume Table  
Scribner Log Rule, Form Class 78**

Volume (Board Feet) by Number of Usable 16-foot Logs

Dbh	1	1½	2	2½	3	3½	4
10"	28	36	44	48	52	-	-
11"	38	49	60	67	74	-	-
12"	47	61	75	85	95	100	106
13"	58	76	94	107	120	128	136
14"	69	92	114	130	146	156	166
15"	82	109	136	157	178	192	206
16"	95	127	159	185	211	229	247
17"	109	146	184	215	246	268	289
18"	123	166	209	244	280	306	331
19"	140	190	240	281	322	352	382
20"	157	214	270	317	364	398	432
21"	176	240	304	358	411	450	490
22"	194	266	338	398	458	504	549
23"	214	294	374	441	508	558	607
24"	234	322	409	484	558	611	665

Sawtimber – Typically pine trees whose diameter is greater than 9.6 inches.

**Q:** What is the volume of a tree whose diameter is 16.5 inches and merchantable height is 47 feet?

**A:** 185 board feet

# Calculating tree planting needs

Mrs. Donnelly wants to plant 100 acres of Slash pine near Ft Pierce. The forester recommends she plant each seedling on a 6' x 12' spacing. How many trees will be needed? (Hint: there are 43,560 sq. ft. per acre)

$$6' \times 12' = 72 \text{ sq ft per tree}$$

$$\left( \frac{100 \text{ acres}}{1} \right) \times \left( \frac{43,560 \text{ sq ft}}{\text{acre}} \right) \times \left( \frac{1 \text{ tree}}{72 \text{ sq ft}} \right) = \mathbf{60,500 \text{ trees}}$$

# Forestry Skills: Pacing

1 pace = 2 steps

The standard unit of distance measurement is the *chain* or *Gunter's chain*, which equals 66 feet. How many of your paces are in one chain?

Several forestry tools are calibrated to be accurate from a distance of one chain.

There are 10 sq chains in an acre. Students should be able to pace an area to determine its acreage as in the next example.

Pacing



# Forestry Skills: Area determination

How many acres are in the polygon? (*Hint: there are 10 square chains per acre*)

Area of the square (**base x height**)

10 chains x 9 chains = 90 sq chains

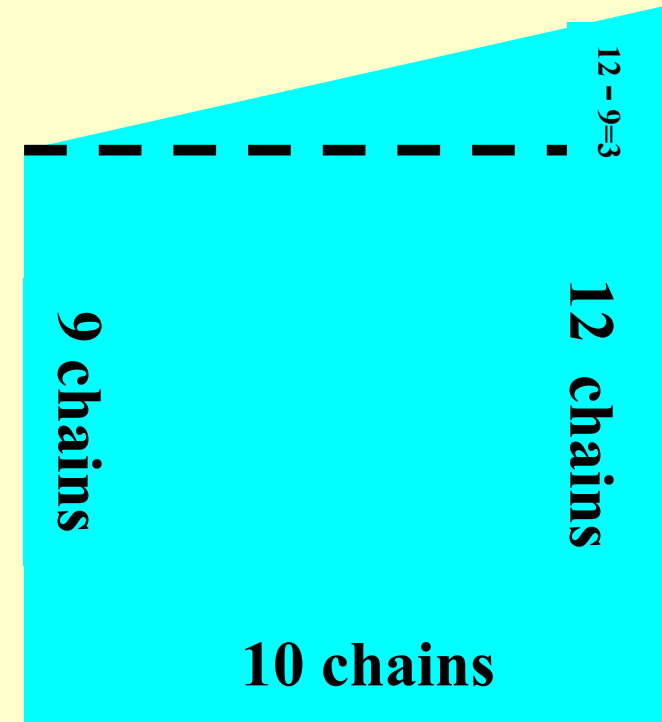
90 sq chains / 10 sq chains per acre = 9.0 acres

Area of the triangle (**base x height**)/2

(10 chains x 3 chains) / 2 = 15 sq chains

15 sq chains / 10 sq chains per acre = 1.5 acres

Total area = 9 acres + 1.5 acres = **10.5 acres**



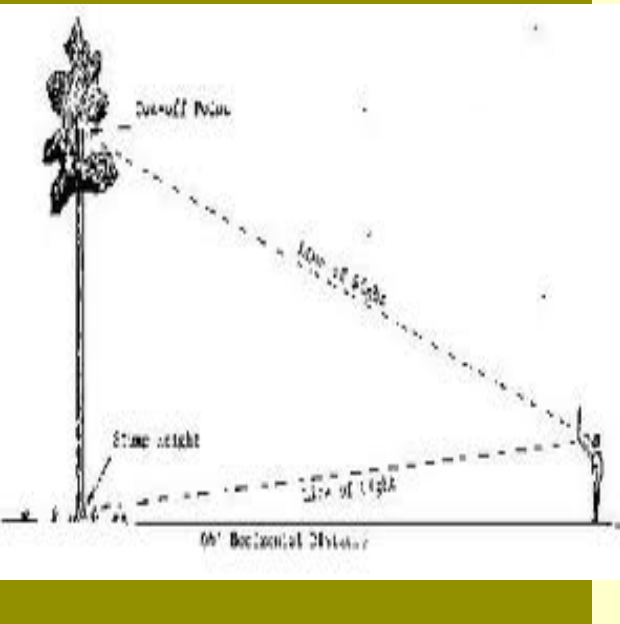
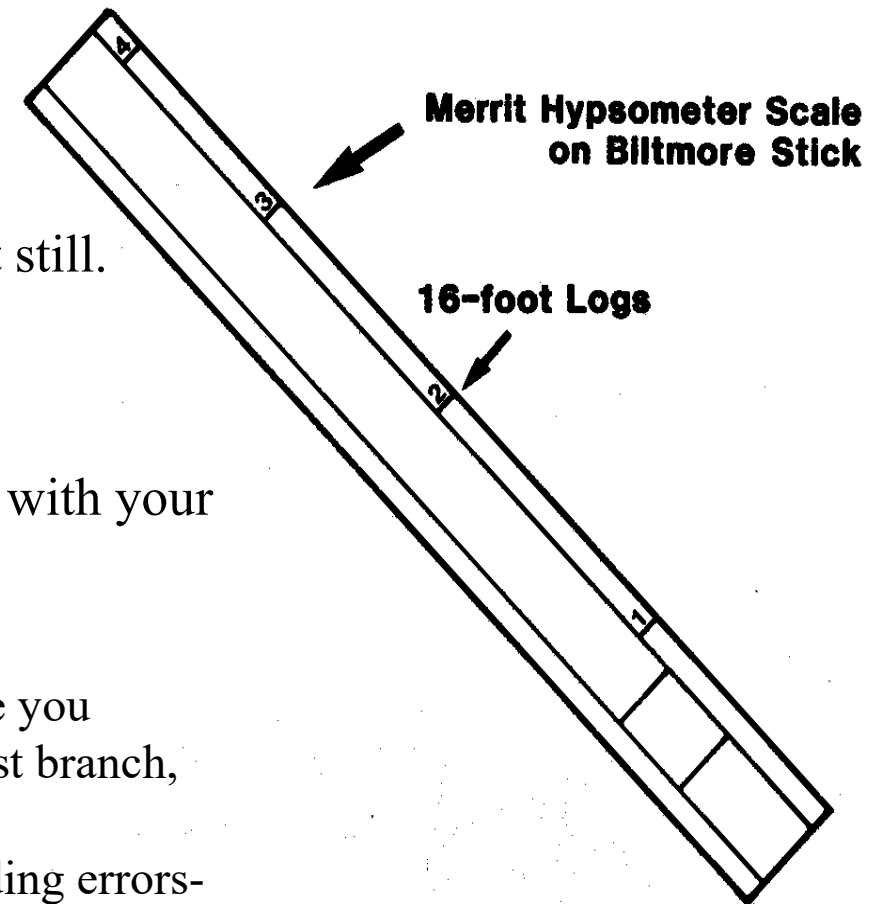
# Forestry Skills: Biltmore Stick

- Used to measure height
- Stands 66ft away from the tree
- Hold 25' from eye
- Hold the stick straight and keep it still.
- Line up the bottom of the stick with the base of the tree.

- Read off the number of 16ft logs with your head still!

## TIPS:

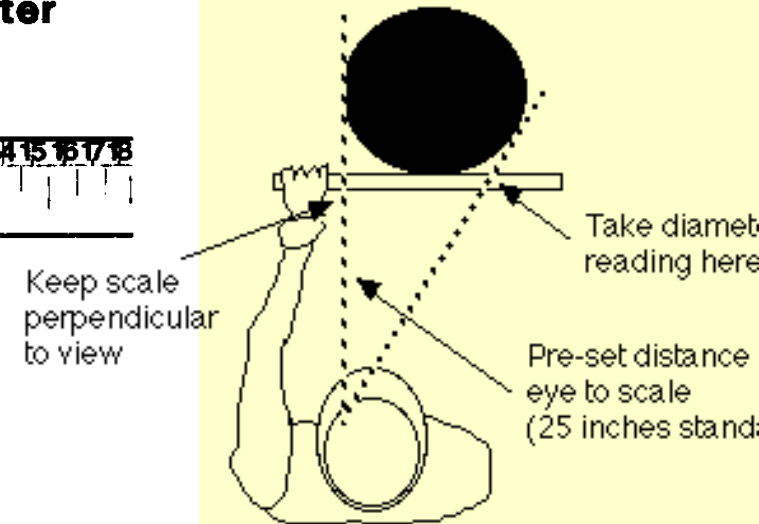
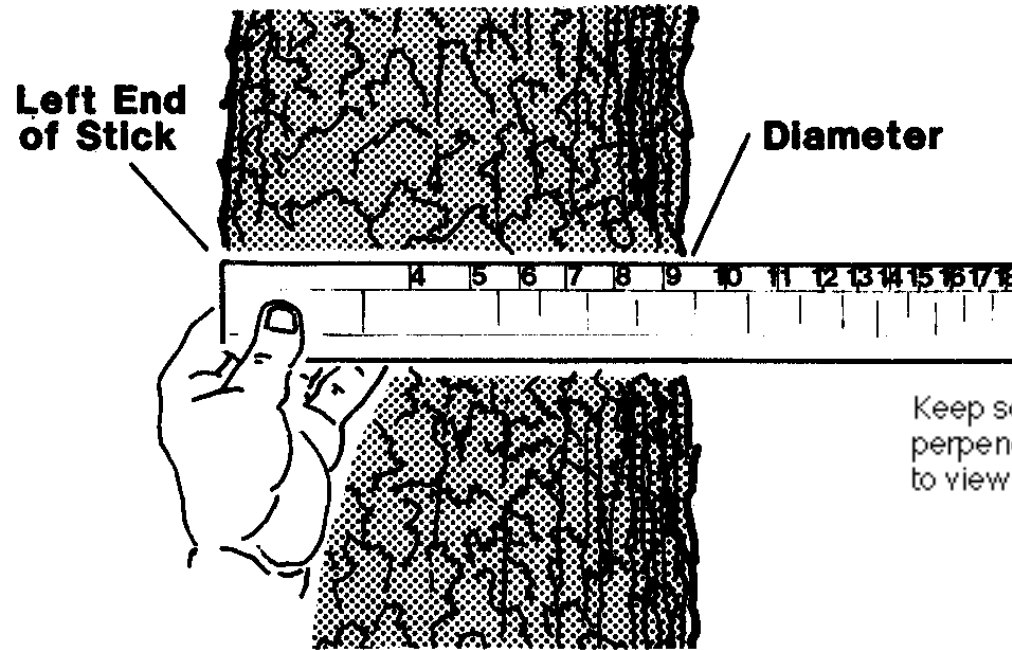
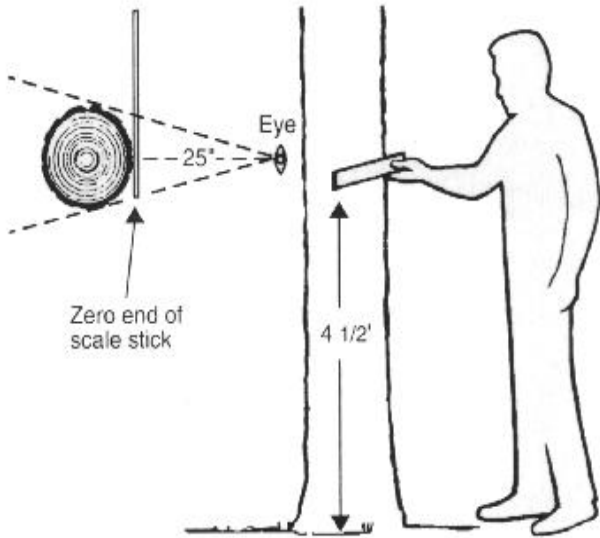
- Read the question carefully- e.g. are you measuring total height, height to first branch, merchantable height?
- Follow instructions regarding rounding errors- e.g. down to nearest  $\frac{1}{2}$  log,  $\frac{1}{4}$  log? Do you have to convert to feet??



**Biltmore  
Stick**

# Biltmore Stick

## Forestry Skills: Biltmore Stick



# Measure Diameter with a Biltmore Stick

- The stick is held against the tree trunk at arm's length (about 25 inches from the eye- practice to get it the right distance!).
- The stick should be perpendicular to your arm and should just touch the trunk.
- Align the "0" (zero) mark with the edge of the trunk, so it appears they are in line.
- Without moving your head, look at the far end of the stick, and note where the other side of the trunk crosses the stick.
- Read the measurement directly from the stick.

That's all there is! The key is to practice for accuracy and consistency.

## **The points to remember are:**

- Keep the stick perpendicular to your reach.
- Hold the stick the right distance from your eye (25 inches is standard, but you can customize your stick)
- Do not move your head when reading the far end (this causes a shift in the intersect with the tree trunk)
- Accuracy is not guaranteed. Practice helps. The nearest two-inch diameter class is acceptable.

# Forestry Skills: Basal Area

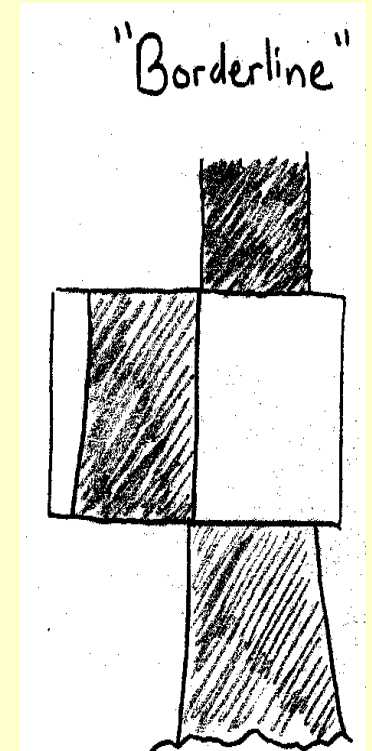
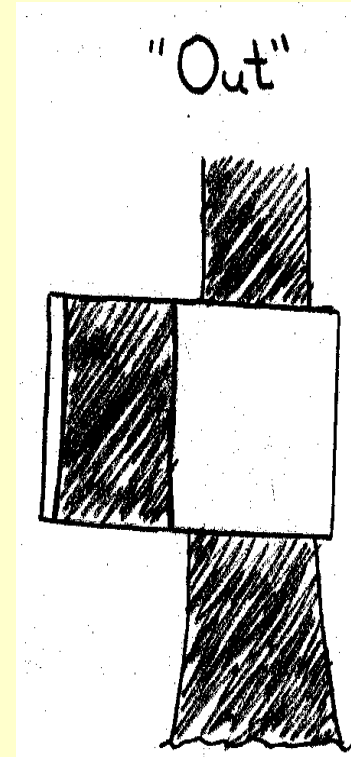
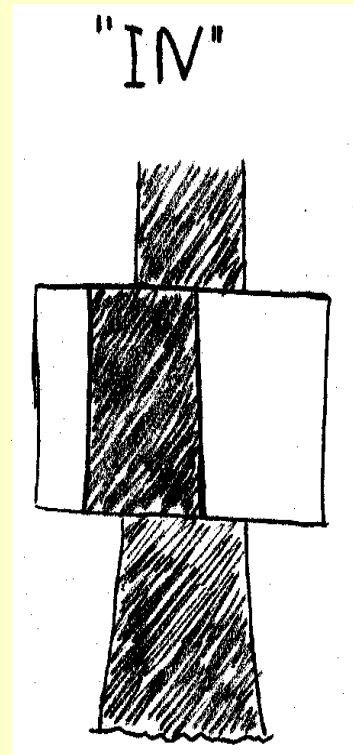
*Basal Area*



# Basal Area

## Using a Prism

Foresters view of trees as viewed through a prism



Students should be able to identify a tree that is "in", "out" or "borderline".

# YouTube Videos to look at!

**Forestry Measurement Skills:**

<https://www.youtube.com/watch?v=xvuLaWGQD2U>

**Pacing:**

<https://www.youtube.com/watch?v=4BBOnRmyM20>

**Biltmore Stick:**

<https://www.youtube.com/watch?v=NOWVuKNwzm0>

**Using a Prism:**

<https://www.youtube.com/watch?v=Y2CdwanfXss>

# Oral question

## *Oral question:*

The 2023 Current Issue is  
**“Adapting to a changing climate”**

The Forestry Oral question will focus on the current issue.

While using the study materials and links for the current issue, students should keep in mind the role and significance of forested rangelands in managing a multi-use rangeland ecosystem.