

# **Unit C: Forest Management**

## **Lesson 2: Measuring Trees**

# Terms

- Basal area
- Board foot
- Breast height
- Cord
- Cubic foot
- Cubit
- dbh
- Hypsometer
- Linear foot
- Merchantable height
- Piece

# Common Units of Measure Used in Forestry?

- Tree measurements are necessary to determine the volume of wood in each tree.
- The total of individual tree measurements and volumes provides an inventory of the whole timber stand.

# Common Units of Measure Used in Forestry?

- Timber trees are measured with a variety of units of measure.
- Some of these units are unique to the wood industry and others are also used for general measuring.

# Metric Board foot

- A unit of measurement represented by a piece of rough wood 0.3048 meter square and 2.54 cm thick. In other words a metric board foot equals 0.0929 square meters.
- The board foot is generally used to measure sawtimber and veneer timber.
- In surfaced or finished lumber, width and thickness are based on measurements before surfacing or other finishing.

# Cubic meter

- A unit of measurement equal to the volume of a cube of rough wood 0.3048 meter in length on each of its six sides.
- A cubic meter contains 423.77 board feet.
- The unit is used to measure all kinds of timber products.

# Cord

- A stack of wood, including air space between pieces, that measures 1.2 meters x 1.2 meters x 2.4 meters, or 3.63 cubic meters
- The cord is used to measure pulpwood and fence posts.

# Cubit

- A stack of wood containing 2.8 cubic meters of solid wood.

# Piece

- A unit of measurement that refers to the number or quantity of timber products of a specified dimension.

# Linear meters

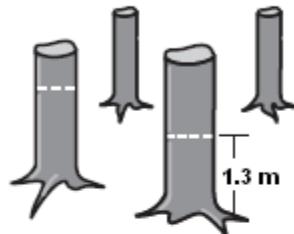
- A unit of measurement used to express the length of a product in meters.
- It is usually a volume of roughly 2 cubic meters.

# Basal area

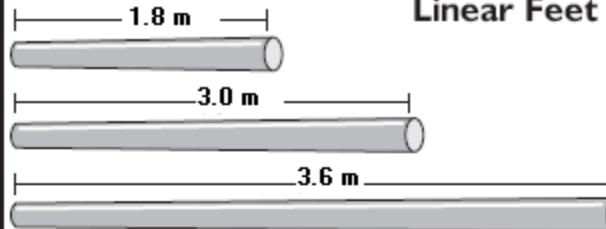
- A unit of measurement applied to standing timber to indicate the level of stocking.
- It is the cross-sectional area of trees at breast height, or 1.3 meters above the average ground line.
- Basal area is expressed in square feet. It may apply to individual trees, or it may apply to all trees when it is expressed on a hectare basis.

### Basal Area

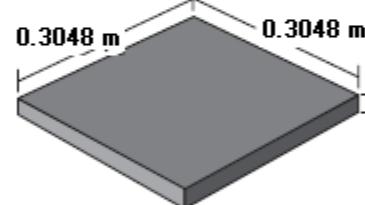
Square feet of all trees measured at dbh on a **hectare**



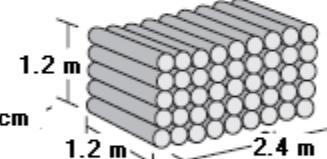
### Linear Feet



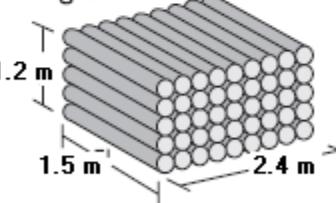
### Metric Board Foot



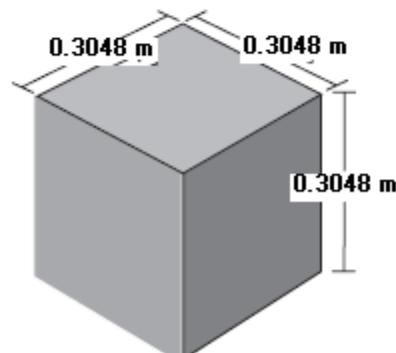
### Standard Cord



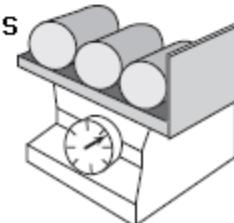
### Long Cord



### Cubic Meter



### Kilograms



# How do I determine the diameter of a standing tree?

- The diameter of standing trees is most commonly measured at breast height. This is known as dbh.

Diameter measurements are taken outside the bark, with deductions made for bark thickness.

Tree diameters are usually recorded in even 5 centimeter classes to facilitate volume determination.

# How do I determine the diameter of a standing tree?

- A diameter tape is the most accurate tool for measuring a tree.
- It is calibrated so that each inch on the diameter side of the 7.97966 centimeters in tape is actually length.
- Because the tape is calibrated in this way, taking a measurement of the tree's circumference produces the tree's diameter.

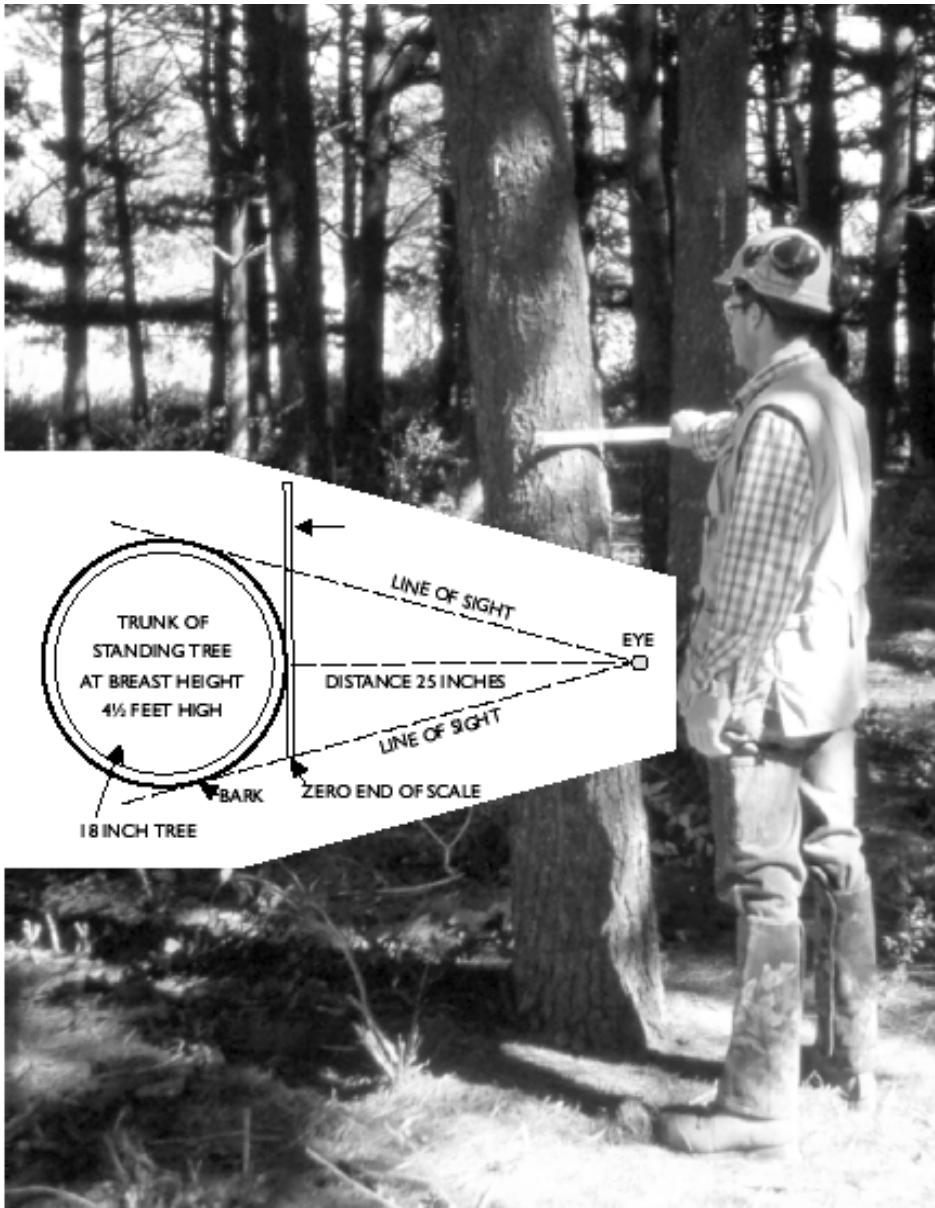
# How do I determine the diameter of a standing tree?

- A technique similar to the one described for using a diameter tape can be used for roughly measuring tree diameter with a Biltmore stick.
- This procedure is based on the geometric principle of similar triangles, with the scale on the stick graduated to read directly in centimeters.

# BILTMORE STICK

- 1. Hold the stick horizontally, at arm's length (63 centimeters from the eye) and 1.3 meters above the ground.
- 2. Place the Biltmore Stick against the tree, with the left end of the stick along one edge of the tree. Keep one eye closed.
- 3. Without moving your head, read the diameter where the right side of the tree intersects the stick

# Diameter Measurement using a Biltmore Stick



# How do I measure the height of standing trees?

- Tree height may be measured in terms of feet or number of logs or bolts.
- A tree is measured to either its total height or its merchantable height.

# How do I measure the height of standing trees?

- Merchantable height refers to the usable length of the tree for a specific product and is measured from the stump height to the cut-off point near the top.

# How do I measure the height of standing trees?

- This cut-off point is located where the stem diameter reaches a minimum size for the product for which the tree is to be harvested or where excess limbs or forks prevent closer utilization.
- Merchantable height for a sawtimber tree is determined by the number of 4.8 meter logs and half logs that can be cut from a tree.

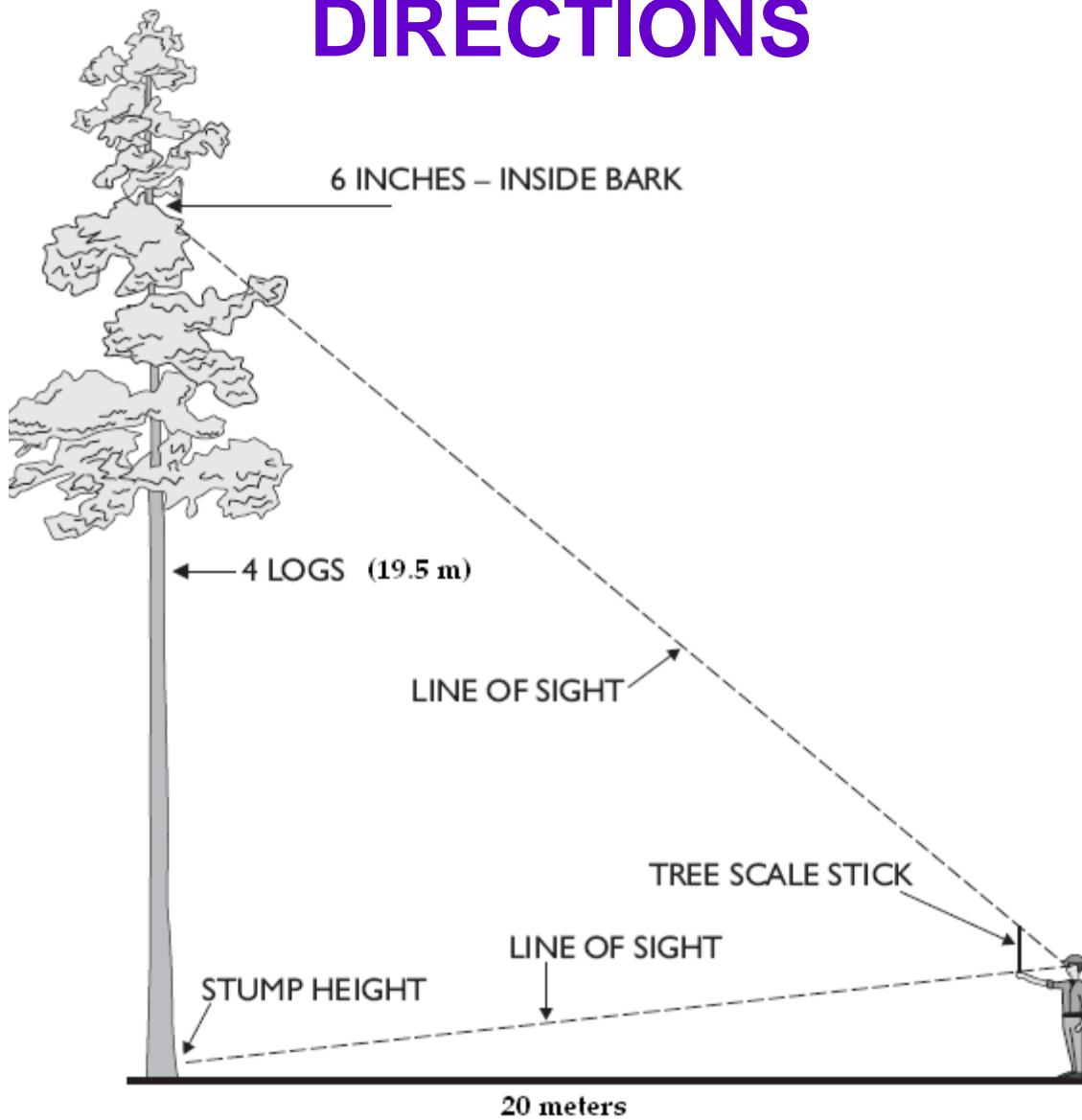
# How do I measure the height of standing trees?

- The cut-off point for sawtimber trees varies from 15 to 25 centimeters.
- Merchantable height for a pulpwood tree is usually tallied to the nearest pulpwood bolt of a given length.
- This will be 1.2 meters, 1.5 meters, or 1.6 meters, depending on pulp mill specifications. The cut-off point for pulpwood is generally 10 centimeters.

# How do I measure the height of standing trees?

- One instrument that is used to measure tree height is a hypsometer.
- Hypsometers (graduated in log length) are normally found on the edge tree scale sticks.
- Most tree scale sticks also have volume tables printed on one of the wide sides.
- A metric tree stick will measure height to 45 meters by 5 meter log lengths.
- Length measure is graduated 0 - 100 by consecutive centimeters

# EXAMPLE OF HYPDOMETER MEASUREMENT DIRECTIONS



# Review / Summary.

- 1. Describe the common units of measure used in forestry.
- 2. Explain how to determine the diameter of a standing tree.
- 3. Explain how to measure the height of standing trees.