

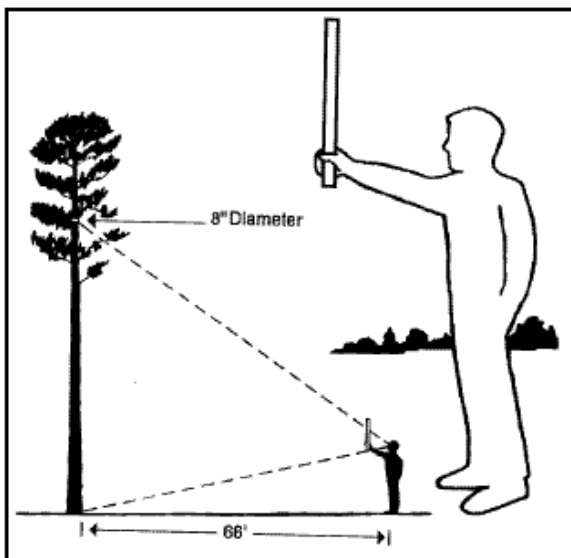
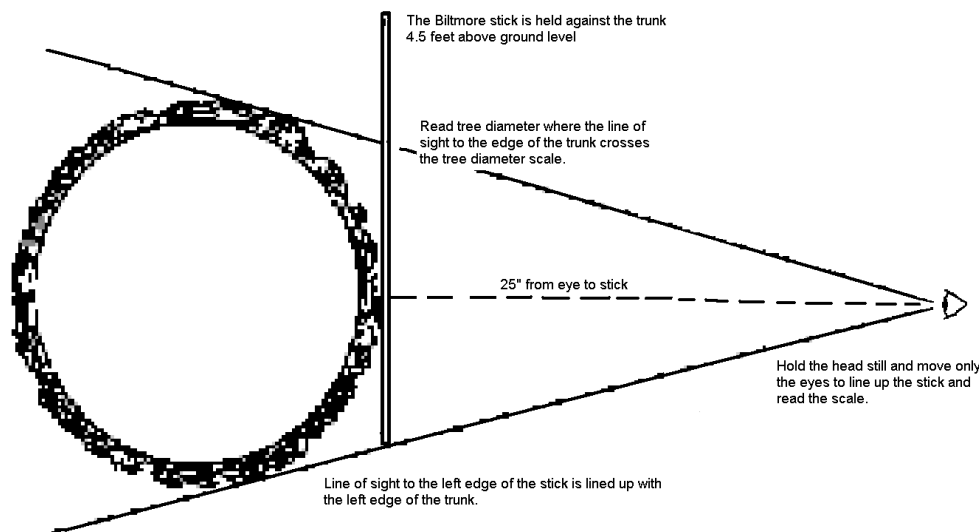
Forest Measurement Tools

The Diameter Tape

Diameter tapes are made of spring steel, nylon or plastic. They are graduated by 3.14 inch marks. This constant factor (the value of pi, π) represents the ratio of the diameter of a circle to its circumference. By measuring the circumference of a tree, an estimate of the diameter can be read directly. This is only an estimate because it assumes all trees are perfect circles, which they are not. Consequently, estimates of tree diameters using a diameter tape run a bit large. Diameter measurements are made at a standard high of 4.5 feet above ground level on the uphill side of the tree. This standard is called “diameter–breast height” or DBH.

The Biltmore Stick

The forester’s yardstick is named for the first forestry school in the United States established at the Biltmore Estate near Asheville, North Carolina. One side of this stick is marked with a tree scale, the other side with a log scale. Both scales are based on trigonometric functions. The tree scale measures a tangent to a circle from a point exactly 25 inches from the tree. The stick is graduated to show the diameter as if it were projected from the user’s eye into the center of the tree.



One edge of the Biltmore stick is marked with a Merritt hypsometer used to estimate tree height. The hypsometer is based on the same rules of trigonometry as the tree scale. To estimate the height of a tree, stand 66 feet from the base of the tree, (66 feet is the standard length of a surveyors chain). Hold the stick vertically, 25 inches from your eye with the line of sight to the bottom edge of the stick lined up at “stump height” on the tree. This is usually about 18” from ground level. Without moving your head, find the line of sight to the top of the tree, or to the highest marketable log or half log. Read the estimate where the line of sight crosses the hypsometer scale.

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Using the DBH (diameter at breast height) and the height to the top of the last log, you can use the board foot volume table printed on the Biltmore stick to estimate the volume of wood in the tree. The estimates of board feet will vary depending upon which log scale or log rule is used. Scribner, Doyle and the International $\frac{1}{4}$ " log rules use different assumptions regarding the taper of a "typical" log. The International $\frac{1}{4}$ " log rule is considered the most accurate for estimates in Pennsylvania.

The instructions for use of each scale and the hypsometer are usually printed on the Biltmore stick.