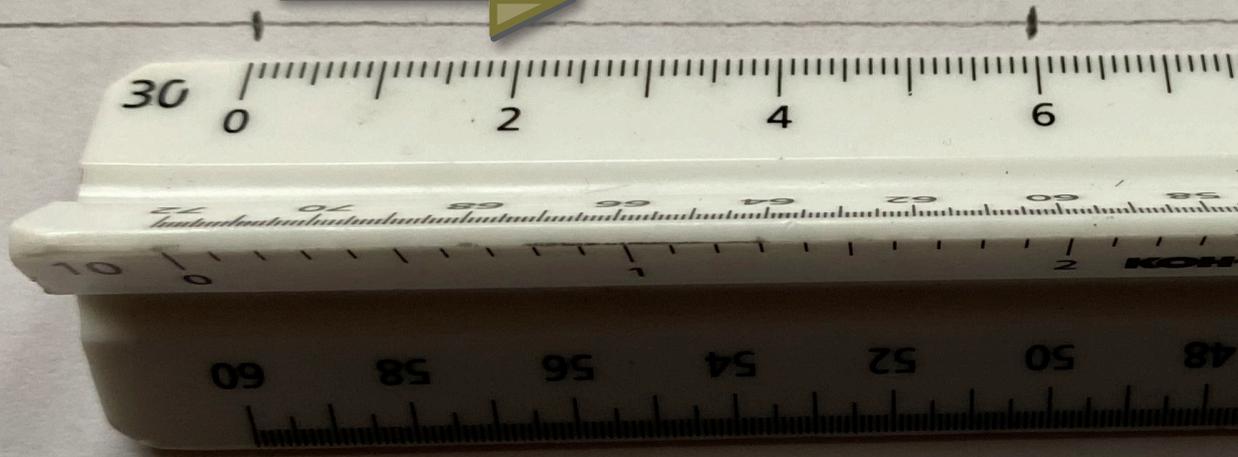


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CHAPTER

2

**UNITS OF
MEASURE & DISTANCE**





Units of Measure & Distance

Forestry is a science based on measurements. These measurements are the basis for all other aspects of forestland management. In this chapter we will begin to explore some of the basic units of measure used in forest assessments. These foundational skills are building blocks for many other activities and are therefore very important to understand and apply properly.

ENGLISH OR METRIC?

Forest managers use a variety of measurement units. While the English system commonly is used in the United States, metric is widely used in much of the rest of the world. In this manual we will use the English system of measurement.

USING AN ENGINEER'S SCALE

For measuring distances on maps and other short distances, foresters generally have adopted the engineer's scale. This scale allows for precise measurement in a decimal format as opposed to using fractions of inches. A typical engineer's scale has six scales arranged on a triangular wooden or plastic ruler. The scales are 1/10, 1/20, 1/30, 1/40, 1/50, and 1/60 of an inch.

When using your scale, look at the equivalent of different points along the various scales. A quick way to determine inches is to count the tick marks then divide by the scale (10, 20, 30, etc.). On the 50 side of the scale, for example, the large mark between the 4 and 6 mark is 5, or 50 (1/50) tick marks, which is 1 inch. Therefore, 1 inch is represented at the 5 mark, 2 inches at the 10 mark, 3 inches at the 15 mark, etc.

It takes a little practice to use the different scales, but they allow a great deal of flexibility and precision in marking lines of a given distance or in measuring distance between points. See video 2:1, [Using a Scale](#), on the Alabama Extension website at www.aces.edu/go/ForestInventoryBasics.



An engineer's scale can be used to make more precise measurements on maps than a traditional ruler.

USING A TAPE TO MEASURE DISTANCE

Your 100-foot tape/Logger's tape is in English units. The inch is a common unit of measurement, but in forestry we seldom use feet and inches but rather measure in feet and tenths of feet (0.1 or 1/10). This allows for decimal recording of measurements. Look at your 100' tape. How is it marked? Where is the 0 mark? Note that it may be at the very end of the metal loop and not on the tape itself. See video 2:2, [Reading a Measuring Tape](#), on the Alabama Extension website at www.aces.edu/go/ForestInventoryBasics.

All distances measured using a tape are assumed to be horizontal distances unless otherwise specified. The distance along the slope is the slope distance and is



Horizontal distances in the field can be measured using a logger's tape or 100-foot reel tape.

always greater than horizontal distance. If slope distance is measured rather than horizontal distance (and not converted), all measured distances will be too long.

To measure horizontal distance on a sloped area, the person on the uphill side of the slope holding the tape should hold it at or near the ground; the person on the downhill side should hold the tape above the ground, making the tape as level as possible. When measuring, make sure the tape is pulled taut (but not overly tight) and straight.

Sometimes the distance is longer than your tape length or the slope is steep. In those cases, you may need to break up the measurements into two or more shorter measurements (this is called *breaking tape*). These measurements are then added together for the total distance measurement. See video 2:3, *Breaking Tape*, on the Alabama Extension website at www.aces.edu/go/ForestInventoryBasics.

THE CHAIN: A COMMON UNIT OF MEASURE IN FORESTRY

The surveyor's or Gunter's chain historically was used to measure distance. A chain is equal to 66 feet. This unit of measure was used in surveying many of the original property boundaries in the United States.

We will talk more about the chain (66 feet) as a unit of measure in forestry in future chapters. For now, just remember that if someone refers to a distance in *chains*, that means it is in multiples of 66 feet. For example, if your forester says that something is "4 chains away," that means it is a distance of 4 times 66 feet, or equal to 264 feet away.

In forestland management, we rarely use feet and inches but instead measure in feet and tenths of feet. This allows for a more precise, and often easier to calculate, decimal recording of measurements.

YOUR TURN

Take a few minutes to familiarize yourself with the engineer's scale. Measure the lines below with the designated scales and record the results to the nearest two decimals (0.00).

20 scale	_____	Length _____
50 scale	_____	Length _____
30 scale	_____	Length _____
10 scale	_____	Length _____
40 scale	_____	Length _____
60 scale	_____	Length _____

ANSWERS 20 scale: 41 tick marks ÷ 20 = 2.05 in.; 50 scale: 173 tick marks ÷ 50 = 3.46 in.; 30 scale: 117 tick marks ÷ 30 = 3.90 in.; 10 scale: 4 tick marks ÷ 10 = 0.40 in.; 40 scale: 88 tick marks ÷ 40 = 2.20 in.; 60 scale: 195 tick marks ÷ 60 = 3.35 in.