

Measuring Tree Height using a Clinometer

Tree heights are measured using a principle called triangulation and with a device called a clinometer. The clinometers can be purchased from many US suppliers and are easy to use, very practical and can be mastered easily. Probably the most important step in the process of triangulation is correctly measuring the distance from the tree.

Figure 1. below is an example of a common clinometer. These may be purchased from many vendor sources.



Figure 1. An example of a clinometer.



Figure 2. The tree height measurement process (Pecan tree in this illustration was 34.5' measured at 100').

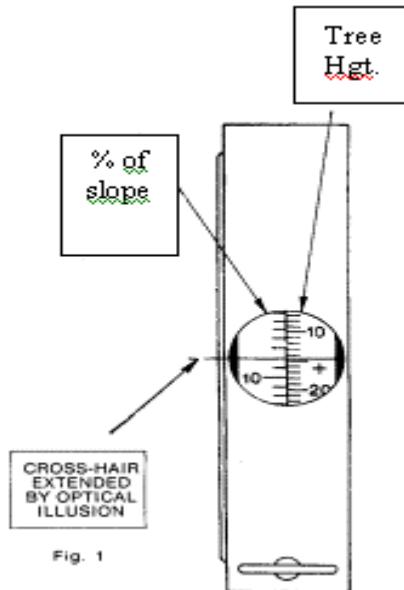


Figure 3. The clinometer scale with % scale on the left and topo scale on the right.

There are a variety of clinometers available today so check your instrument to see which side of the scale is for topo and which is for %. **Figure 3** above illustrates a typical clinometer with the % scale on the left and the topo scale on the right. Verify the scales by leveling the clinometer parallel with the height of your eyes until the scale reads "0" and the scale indicators will be visible.

For tree height measurements using the topo scale:

- 1.) Use the right, topo scale:
 - a. Height can be measured with this scale at 66 feet from the center of the base of the tree. Measure or pace out from the center of the tree base perpendicular to the slope for the best and easiest readings.
 - b. Read the right scale directly with both eyes open (**Figure 4**). The height measurement is in feet.
 - c. Height is measured from the base of tree at ground level to top of crown, peak of terminal leader (dendritic tree forms) or the average of the tree crown (**Figure 5**). Read the right scale for measurement of height.
 - d. (**Figure 6** and **Figure 7**) illustrate the effects of slope on tree height measurement.
 - e. If tree height is greater than 50', use the left or the % scale.

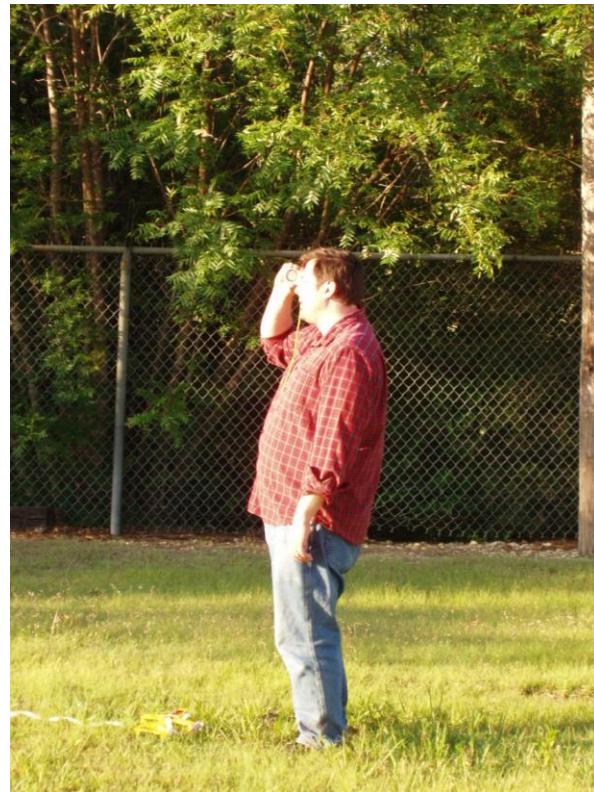


Figure 4. View of data collector using clinometer to measure tree height.



Figure 5. Top of Tree Crown. This example is a Silver Maple (*Acer saccharinum*), a dendritic tree form in middle age.

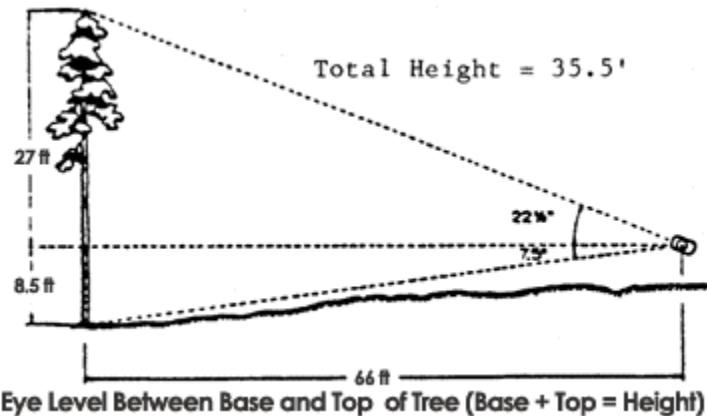


Figure 6. Example of height measurement with the tree base below eye level. Base of tree reading is -8.5 ft and top of tree reading is 27.8 ft; Total height is 35.5 ft.

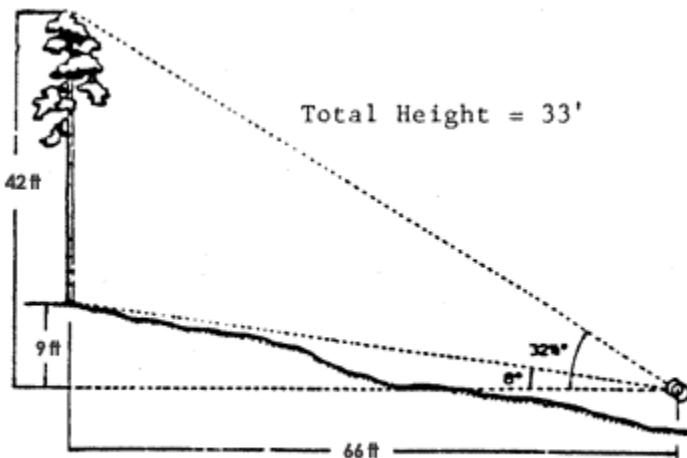


Figure 7. Example of height measurement with the tree base below eye level. Base of tree reading is 9 ft and top of tree reading is 42 ft. If, as in this example, your eye is below the base of the tree subtract 9 ft from 42 ft to get total height of 33 ft.

For tree heights using the % scale:

- 2.) Use the left, % scale:
 - a. Height can be measured with this scale at 100 feet from the center of the base of the tree. Measure or pace out from the center of the tree base perpendicular to the slope for the best and easiest readings.
 - b. Read the right scale directly with both eyes open (**Figure 4**). The height measurement is in feet.

- c. Height is measured from the base of tree at ground level to top of crown or peak of terminal leader (**Figure 5**). Read the left scale for measurement of height.
- d. See (**Figure 6** and **Figure 7**) illustrate the effects of slope on tree height measurement.
- e. Follow the rules as stated
- f. If tree height is greater than 100', the distance from the base of the tree should be doubled to 200', read the % scale on the left side of the clinometer and multiply by 2 to get tree height in feet.