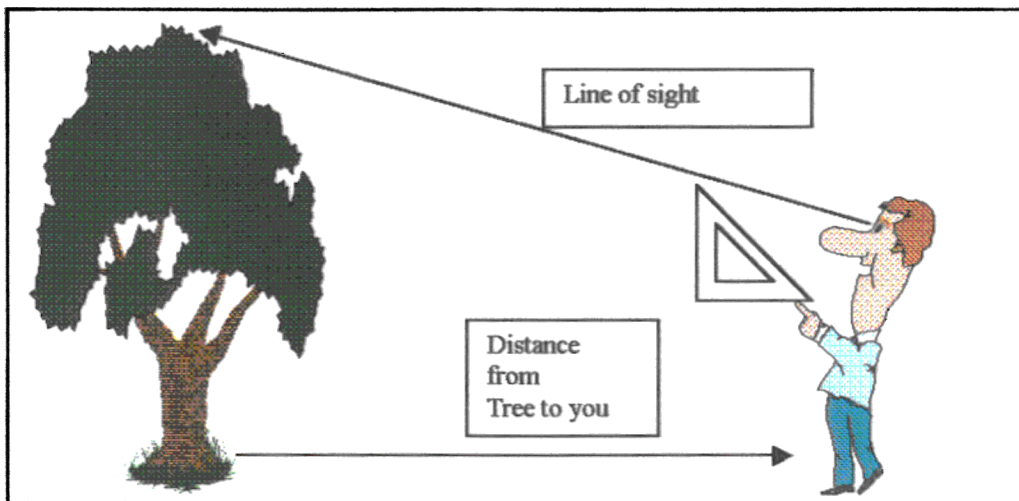


WORKSHEET FOR ESTIMATING TREE HEIGHTS (USING SIMILAR TRIANGLES)

To estimate the height of any tree, you can use a standard right triangle with a leveling mechanism. In this field exercise we will use a 45-45-90 4" plastic right triangle with a line and weight attached, and a tape measure to find the distance from the tree to the observer's position.



Each team will consist of three people: one person sights the triangle, one who watches from beside the sighter to make sure the triangle is level with the ground, and the third to measure and record the distance from the tree.

PROCEDURE:

- 1) The sighter will move away from the tree while facing the tree, and keep the triangle as still as possible where he can see the top of the tree over the point of the triangle. When the top of the tree lines up with the tip of the triangle, the sighter stops.
- 2) The observer then looks closely at the triangle to make sure the triangle is held at eye level and that the triangle's bottom side is parallel to the ground below. The observer then asks the sighter to verify that the tip of the triangle is lined up with the tree top.
- 3) If the sighter answers yes, then the recorder measures the distance from the tree to the sighter in meters (down to 1/10 meter), and measures the height from the ground the eye level of the sighter. This information is recorded below.
- 4) The three steps are repeated for six different types of trees. Each person should rotate to a new position with each tree measured so that everyone gets to do each job at least twice.

Tree	Distance from tree to Sighter in meters (D)	Height to sighter's eye level in meters Hs	Calculated height of tree (h)

- 5) After the data is collected, then the team may go to the nearest park bench, sit down, and calculate the height of the trees. This is done by determining the ratio of the long side of the triangle to its vertical side in centimeters.

Vertical side V _____ cm
/ Long side L _____ cm

Then use this ratio (which is the same ratio as the height of the tree to the distance (D) of the sighter from the tree) to determine the height of the tree (h). $h = (V / L) \times D + H_s$