



How much carbon is locked in that tree?

Intercept theorem worksheet – how does the forester’s triangle work?

To estimate the height of trees, we have use what is called a forester’s triangle. How does this work?

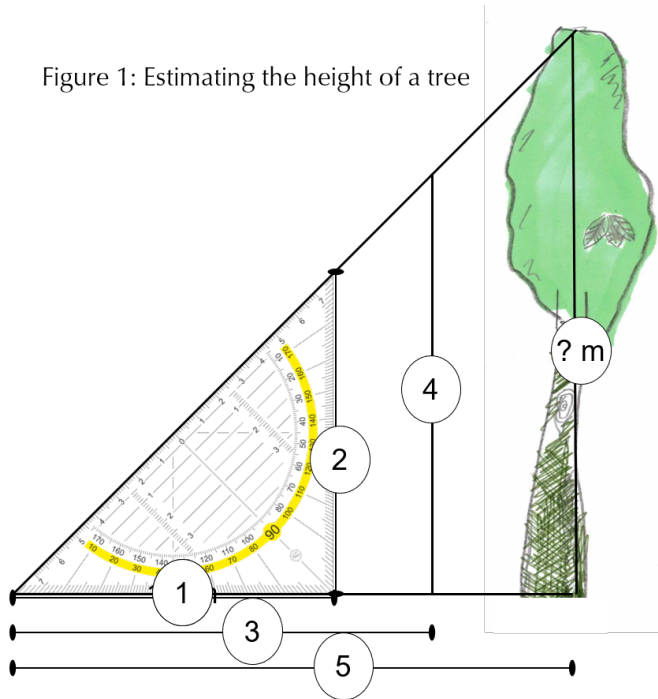
Exercise 1 – What is the relationship between tree height and distance when the hypotenuse meets the treetop?

1. Open the GeoGebra sheet: <https://www.geogebra.org/m/md6fgpx5>
In the beginning, don’t use the slider “change forester's triangle”.
2. Click on the slider “Your distance to the tree is...” to move the person so that the line of sight across the hypothesis of the triangle (the longer side opposite the right angle) points to the top of the tree. This is the dashed line that slopes upwards.
3. Note the distance to the tree and display the tree height in cm (click on the box in the upper-right corner of the image).
4. Note the distance to the tree and the tree height.
5. Now vary the tree heights using the slider, and note the tree height and the respective distance to the tree at which the line of sight falls on the tree height (top of the tree).
6. Repeat this at least two more times.
7. What is the relationship between the distance to the tree and the tree height? If you can't see the connection, activate tip 1. Remember: the height of the tree is measured from the ground and not from eye level (the horizontal line coming from the person's eyes).

Briefly explain your observations:

Prove your explanation:

Figure 1: Estimating the height of a tree



Enter your measurements in the table (cm)

1st triangle 	1	2
2nd triangle 	3	4
3rd triangle 	5	? _____

- Use a ruler to measure sides 1 and 2 of the triangle in the figure above and record your results in the table.
- Now measure the lengths of sides 3 and 4 of the larger triangle. Enter your results in the table.
- Now measure distance 5 to the tree.
- Can you tell how tall the tree is without measuring it?



Exercise 2 – What happens if you use a triangle with different side lengths?

1. Now change the side lengths of the triangle, “a” and “b”. This can be done using the box "Change forester’s triangle (cm)".
2. Consider the quotient of the two sides (this is displayed in the bottom-right corner).
3. What is the relationship between this number and the following quantities: distance to the tree, tree height, and eye height of the person? Try different side lengths of the triangle and note the results.
4. If you check tip 2, the distance will be displayed. Compare the two numbers (quotient of the forester's triangle and the result of tip 2).
5. What can you conclude about what kinds of triangle work for this method?

Hint:

Remember again: the size of the tree is measured starting from the ground and not starting from eye height (the horizontal line starting from the person's eyes).