10 Ways to Measure a Tree

A variety of simple and more complex methods to measure the height of a tree

9-12

Estimate & Measure

1) Estimate

Compare the height of the tree to a known object. If your partner is 1.5m tall, is the tree 7 times as high? A football goal is usually 2.44m tall, a car height can be measured and compared etc.

2) Look through your legs

Stand with your back to the tree, about as far as you estimate the tree height is from the tree. Look backwards, through your legs. You are trying to just see the top of the tree. You will need to move towards or away from the tree until you are just able to see the tree top. The distance you are from the centre of the trunk is the tree's height.

3) Use a pencil and a pal

Hold a pencil up vertically at arm's length, with the sharpened tip at the top of the tree. Hold the pencil near the opposite end. Move towards or away from the tree until your thumb lines up with the ground level, while keeping the tip of the pencil on the top of the tree.

Without moving your grip, arm length or feet, turn the pencil horizontally. Line your thumb up with the centre of the trunk on the ground. Get your partner to move out from the tree until their feet are at the tip of the pencil – without walking towards or away from you, only sideways.

The distance from their feet to the centre of the trunk is the height of the tree.

4) Use two people the same height

You need a partner who is as close to your height as possible.

One of you lies down, feet towards the tree, about the distance from the tree that you estimate it high. Your partner stands at your feet.

The person lying on the ground needs the top of their partners head to line up with the top of the tree. You will need to shuffle and wriggle, to move away or towards the tree a few times until you achieve this.

The distance from the lying down person's eyes to the centre of the tree trunk is the height of the tree.

5) Use a measuring stick (Simple version)

Each pair need a stick (a metre rule would also work). You need to hold your arm out, lay the stick on your arm and line the tip of the stick up with your shoulder. Grasp the stick where it lies in your hand.

Hold the stick vertically, without letting it go or moving your hand on the stick. Walk backwoods until the tip of the stick lines up with the top of the tree. Your partner can check that your arm is parallel to the ground and the stick is vertical.

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The distance you eye is from the centre of the tree trunk **(A)**, plus the height your eye is from the ground **(B)**, is the height of the tree.

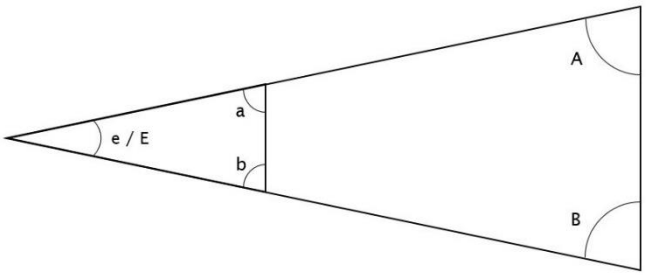
A ( ) + B ( ) = (The height of the tree)

6) Use a measuring Stick (Advanced Version)

You can make this as advanced as you would like – It can become an advanced trigonometry calculation.

Use a stick the same length as your arm (shoulder to fist). Hold the stick at arm's length, vertically. Walk backwoods away from the tree until you see the tip of the stick is at the top of the tree and your thumb is on the trunk at ground level. Without the first person moving, a partner needs to carefully measure the distance from eye to top and bottom (thumb location) of the stick, and the length of stick from thumb to tip.

If you want the task to be easy, measure the distance from the stick-holders eye to the centre of the tree trunk. To make it more challenging, ask the group to use trigonometry to solve the problem with only 30cm rulers allowed.



Two similar triangles inside each other. The angles of the two triangles are the same.

7) Use a piece of paper and a pal

Fold a piece of A4 paper into a 45* angle. Hold it up vertically, line it to your eye, looking up the hypotenuse (long) side. Walk backwoods away from the tree until you are seeing the top of the tree. The distance you are from the centre of the tree trunk **(A)**, plus the height your eye is from the ground **(B)**, is the height of the tree. Your partner can check that you have the paper triangle vertical overall and horizontal on the short side.

A ( ) + B ( ) = (The height of the tree)

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8) Compare shadows

You can use the shadow of a known object - a meter stick or a pupil of known height works well.

What is the height of your known object? **(A)**	
What is the shadow length of the known object? **(B)**	
What is the shadow length of the tree? **(C)**	
How many times longer is the tree shadow than the known object shadow? **(C ÷ B = D)**	**(D)**
Multiply the factor of shadow length by the known object height. **(D × A = height of tree)**	

9) Use a bucket of water

Set a bucket of water down as far from the tree as you estimate it high. Stand back from the bucket, positioning yourself so that you can see the top of the tree reflected, in the centre of the bucket.

A. measure the distance from the tree to the bucket
B. subtract water depth from the height of your eye above the ground
C. measure how far away you are from the centre of the bucket

The height of the tree is approximately: **A** x **B** / **C**

For better accuracy, repeat the measurements and calculations with the bucket moved to a new spot as far away from the tree as the calculated tree height.

10) Download an app

Both the Google Play and iTunes stores have free measuring apps. We have used the 'Measure Height' from Deskiss app with success. Get the pupils to repeat the measurements from different places several times to increase accuracy.

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