

# Fieldwork in the Forest: Measuring height and light

How to survey the height of trees, tree canopy cover and light in two different woodland types (conifer plantation and mixed broadleaf woodland).



## Enquiry questions

Does tree species, tree height and tree canopy cover impact the amount of light that reaches the forest floor in two contrasting woodlands (conifer plantation and mixed broadleaf woodland)?

How do different management aims of woodland owners impact upon the amount of light in a woodland and what impact does that have on biodiversity?

## Equipment

- Tree species identification resources
- Clinometer
- 30 metre tape measure
- Calculator
- Light meter
- Quadrat (1 metre squared)
- First Aid Kit
- Mobile phone or walkie talkie
- Risk assessment and emergency procedures

## Fieldwork methods

Tree species, height and canopy cover can be surveyed using random, stratified or systematic sampling.

### Tree identification:

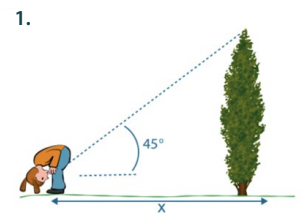
Before you start to measure trees in the woodland identify them by their common and scientific names. Many parts of a tree can be used for identification: leaves, bark, fruit, flowers, nuts, seeds, form, and sometimes the smell of sap if a leaf, twig or small branch breaks. There are many easy to use tree identification resources and Apps now available in the UK:

- Woodland Trust provide free downloadable identification resources [www.woodlandtrust.org.uk](http://www.woodlandtrust.org.uk)
- The Field Studies Council sell comprehensive tree keys with images and information that are designed for use outdoors - [www.field-studies-council.org](http://www.field-studies-council.org)
- OPAL have free web based identification resources [www.opalexplornature.org](http://www.opalexplornature.org)

### Tree height method 1: *an upside down estimate!*

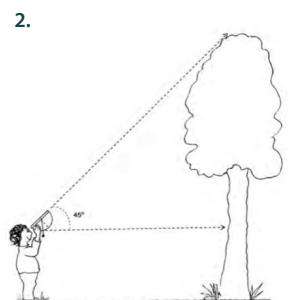
This method does not require any equipment and is a fun, easy and quick way to estimate the height of the tree:

1. Choose a tree. Stand at the base of the tree and then walk away from the tree in a straight line.
2. At regular intervals (approx. 5 steps), stop and bend forward to look through your legs back up at the tree.
3. When you are at a point where you can just see the top of the tree through your legs then stop.
4. Measure the distance from the bottom of the tree to where you stopped (1 pace is approx. 1 metre). This distance is the estimated height of the tree.



### Tree height method 2: *using trigonometry*

1. Choose a tree. Person 1 stands at the bottom of the tree with a clinometer.
2. Person 1 carefully walks backwards away from the tree in a straight line, keeping the clinometer's sight line in line with the top of the tree.
3. Person 2 follows Person 1 and watches the clinometer's wheel.
4. When the arrow points to 45 degrees on the clinometer wheel, Person 2 tells Person 1 to STOP!
5. Person 2 measures the distance from Person 1 to the base of the tree. This distance is equal to the height of the tree minus the height of Person 1 to their eyes (as the 'triangle' has to finish at your feet not your eyes).
6. Person 1 then adds their actual height to the distance from the tree and this gives an accurate measurement of the tree height.



## Canopy cover and light measurement

To compare the amount of light reaching the forest floor in two different woodlands, replicate the following fieldwork methods in each woodland:

1. Choose sampling points in the woodland by either throwing a quadrat randomly a set number of times within the woodland, or within a 10m x 10 m square marked out on the forest floor with tape measures.
2. At each sampling point: Person 1 holds the quadrat straight above their head to frame the canopy area of the tree.
- 3 Person 2 records the estimated percentage tree canopy cover that Person 1 observes through the quadrat. (A quadrat that is subdivided into a grid can be easier to make estimates with).
4. At the same sampling points, use a light meter to record the intensity of light reaching the forest floor. Record the light readings in lux.



### Images

1. upside down method
2. trigonometry method
3. estimating canopy cover
4. using clinometers to calculate tree height

## Analysis and presentation

### Enquiry question:

**Does tree species, tree height and tree canopy cover impact the amount of light that reaches the forest floor in two contrasting woodlands (conifer plantation and mixed broadleaf woodland)?**

- The data collected from tree species identification will indicate the woodland composition of broadleaf trees or coniferous trees. An estimate of percentage coverage by broadleaved and conifer species can be made for each woodland, and then compared with light intensity readings and canopy cover data.
- A broadleaved woodland may have greater light intensity reaching the forest floor, due to leaf fall in autumn and a less dense canopy (leading to lower canopy cover measurements).
- Light meter readings should be analysed critically as time of day, season and weather conditions can all influence the light in a woodland. However, light readings could be used to draw conclusions about woodland structure in combination with other data collected on tree height and canopy cover.

### Enquiry question:

**How do different management aims of woodland owners impact upon the amount of light in a woodland and what impact does that have on biodiversity?**

- Tree species identification, woodland classification and tree height data may indicate the type of woodland management being practiced. The woodland owner may share their management plan to further explain species choice and purpose.
- The data from light intensity readings, tree height and canopy cover percentages could be correlated with fauna and flora surveys of the forest floor (see other fieldwork methods). Conclusions can be drawn about the impacts of different types of woodland management on biodiversity.