

Woodland/Hedge Survey (KS3)



Learn how to identify trees in your woodland or hedgerow and come up with your own management plan of how to look after your greenspace.



What is that tree? How tall? How wide? There are many questions about trees in woodlands that we wouldn't be able to answer without gathering data and using different surveying methods.

- Tree ID Guide
- Worksheet (Appendix1)
- Tape measure
- Trundle wheel (optional)
- DBH tape (optional)
- Clinometer

Subject

Science, Mathematics & Geography

Learning Objectives:

- Observe, measure, and record physical features
- Calculate in real-life situations
- Measure and find area.

Lesson Plan:

Warm-up/introduction

Discuss estimation; challenge children to stride 10 meters and check using a trundle wheel or tape measure.

Estimating the height of a tree: Here are some fun ways to estimate the height of large mature trees. You can estimate the height of a tree by looking back between your legs! Carefully, walk away from the tree you are measuring in a straight line. Look between your legs at the tree every few steps until you can see the top of the tree. Measure the distance between you and the tree, where this is roughly the tree's height.

Main Learning

How do people check a woodland is healthy and monitor the trees?

Surveying your woodland/hedge need some tools and equipment for gathering appropriate data on the health of your woodland/greenspace. Ask the students what they need to complete the survey?

What are the best ways of identifying trees? If the tree you are looking at isn't on your ID guide, then draw an annotated diagram or a photograph of the tree, concentrating on leaf shape, bark textures and any other identifiable factors such as flowers or seeds. All this information will help you to identify the tree during internet searches or in other ID books.

Split the students into groups and give each group the survey worksheet (Appendix 1).

How to check the health of a tree?

On smaller trees or newly planted trees and easy way of checking if a tree is alive or dead, make a small scratch on the stem of the tree. If you see green on this scratch, then it is alive.

This is difficult on larger, mature trees and checking the health of these trees require much more observation.

GOOD TIP:

Download our free Tree and Bud ID guides to help identify some common tree species you may have in our school or local greenspace.

Poor tree health usually falls into two main categories:

- Living: Bacteria, fungi, insect infestation or other animals
- Non-living: Chemical, machinery damage, soil conditions, moisture levels, weather events



Some signs to watch out for when looking at tree health:

- Thinning leaves: When standing under a tree, can you see blue skies? The crown of the tree offers shade to the roots whilst absorbing the energy from the sun so when leaves on the crown on the top are looking a little thin it could be due to pest infestation (Oak processionary moth) or disease (Ash dieback caused by a species of fungus, *Hymenoscyphus fraxineus*).
- Discoloured leaves: Chlorophyll plays a vital role in photosynthesis and makes the leaves green. Depending on the time of year, if the leaves on your tree are yellowing or turning brown, maybe even falling earlier than they should, this is a sign of further investigation. Yellow (chlorotic) leaves often indicate lack of nutrients or poor root function. This could be due to waterlogging, soil compaction or drought.
- Crown die back and dead wood: a healthy tree should put on new growth every year (in its branches and its trunk). Take a look at the crown of the tree to spot lots of small dead twigs at the end of the branches or the whole branch dying off, then that's a big indicator that the tree is stressed and in poor health.
- Dead, flaking bark: Bark protects trees from external stresses like storms, pests and diseases so without this bark trees can actually bleed when it's damaged. If you spot a sappy-like liquid oozing from the bark then there may be a problem within the cambium (a layer of tissue that helps the tree grow by adding another layer of wood). This could mean a bacterial or fungal infection e.g. *Phytophthora*, a microscopic, fungus-like organisms that can cause dark fluid to ooze from the bark or the Great Spruce Bark beetle, that causes the tree sap to run out of the holes it makes, damaging the cambium.

Extra Learning:

When looking at the pathogens that could harm trees, this is a great opportunity to discuss the adaptation of individuals who might survive, driving natural selection, evolution or extinction.

- Trunk: Keep an eye out for cavities, cracks, bulges and wounds which all indicate possible structural damage, and act as entry points for pathogens. At this point you could discuss the importance of the trunk and what it supports.
- Roots: 50% of a tree's roots are in the top 6 inches of the soil. If roots are exposed and look damaged, maybe some nearby digging has turned them up, then this risks disrupting their feeding system.
- Fungi: There are lots of different fungi that can affect different parts of the tree e.g. Honey fungus is the common name given to several different species which can kill the roots of many trees or bracket fungi such as *Ganoderma* can cause decay and rot in trees.

Timing is key! It's important to know that pests and fungi that affect trees are only present at certain times of the year e.g. if you notice lots of dead wood or twigs on the ground from a Beech (*Fagus sylvatica*) this could mean a fungi (*Meripilus giganteus*) is present. This can only be confirmed from June to September, when the fungus is in season. Any other time could potentially be due to certain weather conditions.

Measuring diameter and height of the tree

Groups of students should work in a quadrat area of 5m x 5m for a survey and measure the trees within that area (for a hedge, survey a 5m portion).

You will need a measuring tape, Diameter at Breast Height (DBH) tape and a clinometer to measure the trees. Clinometers measure the height of the tree but if you don't have any they are easily made from protractors. DBH tapes are specific tapes for measuring the diameter of the tree and it has been specifically calibrated for this. If your tree is multi-stemmed, you will need to measure all the trunk at once (so wrap the tape all around the tree).

Use the worksheet in Appendix 1 to record your findings or get the students to create their own recording sheet. Once they have completed the survey, students could create maps and digitalise them on GIS programmes.

Don't have a DBH tape? No worries! Use a normal cloth tape measure to measure the circumference of the trunk. Once you have the circumference you need to follow this formula to calculate the diameter:

$$\text{Diameter} = \text{circumference} \div 3.14 (\pi)$$



Plenary

Challenge students to each think of a management plan for your school or local greenspace. After the survey has been completed what are the next steps? Could some of the trees survive? Do you need to call a professional arboriculturist to fell a tree or two? How often should the survey take place? Are there anyway that we can improve the woodland?

Some examples:

- Creating habitats for wildlife e.g. bird boxes, bug hotels
- Finding ways to help protect trees
- Create a GIS map of the site and create a spreadsheet of the results to keep for future years.

We would love to see your students learning more about trees! Share your photos with us on Instagram or twitter /cityoftreesmcr

This session can also be linked with Trees Through Time, where students learn how to age trees. It also includes work on the carbon cycle and how much carbon is stored within trees.



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Appendix 1: worksheet

Team members: _____

Name of woodland location: _____

Survey Area: width(m) x length(m) = area(m²)
 _____ m x _____ m = _____ m²

Tree Number	Alive or Dead (tick)		Species	Diameter	Height
	Alive	Dead			
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
Total number of trees					
Total number of alive trees					
Total number of dead trees					
Widest tree (circumference)					
Tallest tree (height)					

Use this box to make any questions of your own and create a table to record your answer!

E.g. How many trees have seeds or fruit on them? How many trees have more than one trunk? How many trees are taller than 3 metres?