These activities are aimed at the second level of Curriculum for Excellence (about 8 to 11 years old). They develop children's skills in estimating and measurement (measuring to the nearest cm), carrying out calculations using decimals and introducing angles. The children look at two ways of measuring tree height and calculate a tree's age from its girth.

CURRICULUM LINKS

Mathematics
- Number, money and measure
  - *Estimation and rounding*
  - *Number and number processes*
  - *Measurement*
- Shape, position and movement
  - *Angle, symmetry and transformation*
- Information handling
  - *Data and analysis*

Languages
- Literacy and English
  - *Listening and talking*

Health and wellbeing
- Physical education, physical activity and sport
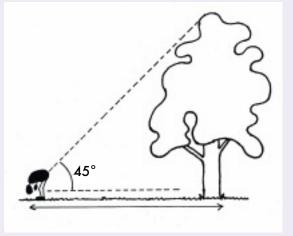 - *Physical activity and health*

TREE HEIGHT

Looking through your legs

You will need: a measuring tape.

Ask each child to choose a tree and ask them to walk away from the tree, but every so often bend forward and look through their legs back to the tree.

When they can just see the top of the tree, the child stops and marks it or gets a friend to stand there. Then measure the distance along the ground from the tree to the marker. This is roughly equal to the tree's height.
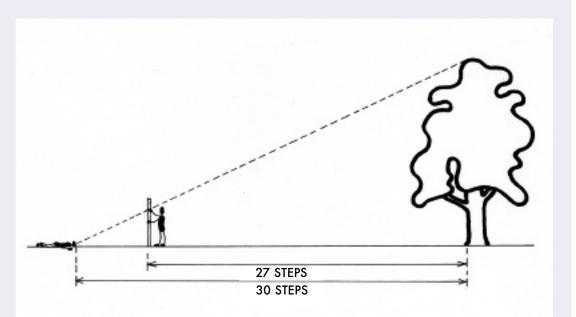
This works because maths says that if you view a tree's top at a 45 degree angle then the height of the tree is equivalent to the distance that you are from that tree.

Using a metre stick

You will need: a metre stick.

Work in pairs. Both children stand up against the trunk of their chosen tree. One child walks 30 steps away from the tree, lies down on the ground and looks up at the top of the tree. The other child walks 27 steps from the tree and holds up a metre stick. The standing child should move their finger up and down the stick until the child lying down can see it is in line with the tree top. The height of the tree is ten times the height marked on the stick.

27 STEPS
30 STEPS

Outdoor & Woodland Learning
SCOTLAND

TREE GIRTH AND AGE

How old is a tree?

You will need: a measuring tape (optional - log/cut stump of tree).

Look at a variety of trees. Discuss which trees the children think are the oldest and why? (Older trees will tend to be taller, larger and with wider trunks.)

If a log/cut stump of a tree trunk is available children can count the annual rings. It is, however, sometimes quite hard to see all the rings, particularly if they are very close together – so it may need to a rough estimate.

The girth of a living tree can be used to estimate its age. Children can use a tape measure or piece of string, to measure around the trunk at approximately a child's head height (about 1 metre from the ground) – measure to the nearest centimetre. This is the girth or circumference of the tree. Roughly, every 2.5cm of girth represents about one year's growth. So to estimate the age of a living tree, divide the girth by 2.5. For example a tree with a girth of 40cm will be sixteen years old.

Carry out a census of trees in the local area. Which are the oldest? Which are the youngest? This information can be made into timelines or charts.

If you know the species of tree you are measuring, you can make this work more accurate, as different types of tree grow at different speeds. Look up the type of tree you have measured in the table and divide the girth by the number given. For example a sycamore with a girth of 110cm is about 40 years old (110 ÷ 2.75 = 40)

Species of tree	Growth of girth per year (cm)
Average	2.5
Oak and beech	1.88
Pine and spruce	3.13
Sycamore	2.75

Whether a tree is in woodland or in the open, also makes a difference to growth. Discuss why this is? Will woodland trees grow faster or slower than trees in the open? Trees in the open grow faster because there is less competition from other trees, for light, water and nutrients. You can build this into your calculations. For example, an average woodland tree increases in girth by approximately 1.25cm per year.

Conifers (pines, spruces, larch, firs) usually grow a whorl of branches each year. If you count the number of whorls of branches up the trunk, you get an approximate age. This is easiest with young trees – up to about 20 years old!

Tree Measuring - 1 and Tree Measuring - 3 are also available for lower and higher levels of Curriculum for Excellence. The **DIY tree measurement kit** outlines more advanced tree measuring techniques. These are all available on the Outdoor & Woodland Learning Scotland website.