**Tree Height**

Measuring the growth of a tree over time provides us with important information about the life of the tree and also about the ecosystem in which it's growing. Growth rates reflect on the amount of water, nutrients and carbohydrates that are available to the tree and this can change from season to season; site to site; and year to year. If you have any trees in or around your school ground, it can be really useful to know how much they grow throughout the year. If your tree is too tall to measure with a tape measure, there are simple ways you can calculate the height of the tree. For this you will need two people.

The first person stands next to the tree. The second person takes a print-out of the guide from the OPAL website and walks back away from the tree. You can also take a piece of card measuring 20cm in height and mark 2cm up from the bottom. Label this as 10%. Hold the card at arm's length. The top of the tree needs to line up with the top of the card, and the bottom of the tree needs to line up with the bottom of the card. When the person with the card is in position, they should guide the person at the tree to the point at the trunk exactly in the level of 10% mark shown at the bottom of the guide. Once the person at the tree has found the correct point, use the tape measure to measure the height in metres of this point from the ground. This will give you 10% of the height of the tree. Multiply this figure by ten to work out the actual height of the tree. If the tree is very tall, use the 5% mark on the side of the guide, or mark 1cm up from the bottom of a 20cm tall piece of card and label it 5% instead. Multiply this figure by 20 to work out the actual height of the tree.

You can also use trigonometry to measure the height of your tree. Here, Keith is measuring a tree's height using trigonometry. He assumes that the tree is at a right angle on the ground on which he is standing. The base of the tree and the top of the tree and Keith form the corners of a right-angled triangle. Keith measures his distance from the base of the tree. Keith can then use a clinometer; this is a small instrument that measures inclination or the angle of elevation; to look up at the top of the tree. If you don't have a clinometer, you can easily make one, just search online for 'DIY clinometer'.

We can now use basic trigonometry to work out the height. Using the equation shown on the screen, we can calculate the height of the tree.

Calculating the height of the tree is a great way to use trigonometry and maths in a real-life context. This, and other parts, of the OPAL Tree Health Survey are really important in building up a picture of the health of trees across the UK.