

Tree Survey: Activity with Key Stage 2

The tree activity will take one hour to complete however, there are further extension and follow-up activities for teachers to continue depending on their level of interest. The objective of the lesson is to enable children to: (i) identify different tree species (ii) measure the girth and heights of trees and (iii) explain the different parts and functions of a tree. The extension activities enable children to learn (i) about the seasonality of trees, (ii) to measure the crown spread of a tree, (iii) engage in, and contribute data to, a national survey using methods employed by scientists and (iv) map a local environment and input data on the tree species they have identified and monitored.

National Curriculum 2013 Links

Science Programmes of Study: Key Stage 2

- Identify and name a variety of plants and animals in their habitats, including micro-habitats.
- Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.
- Asking relevant questions and using different types of scientific enquiries to answer them.
- Setting up simple practical enquiries, comparative and fair tests.
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- Reporting on findings using scientific language, including oral and written explanations, displays or presentations of results and conclusions.
- Identifying differences, similarities or changes related to simple scientific ideas and processes.

Geography Programmes of Study: Key Stage 2

- Use the eight points of a compass, four and six-figure grid references, symbols and key (including the use of Ordnance Survey maps) to build their knowledge of the United Kingdom and the wider world.
- Use fieldwork to observe, measure, record and present the human and physical features in the local area using a range of methods, including sketch maps, plans and graphs, and digital technologies.

Mathematics Programmes of Study: Key Stage 2

- Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- Applying their increasing knowledge of mental and written methods.
- Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels.

Resource Checklist (We will provide resources for the sessions we lead)

- Clinometer
- Role badges
- Crayons (soft) for bark rubbings
- White Paper
- Compass
- Coloured paper
- Blue Tack
- Scissors
- Pins
- Tape measures
- Measuring sticks to measure 1.3m
- Pencils and erasers
- Global Positioning System (GPS)
- Clip boards
- Worksheets downloaded where required

Tree Identification (15 minutes)

Prior to the activity identify and mark four different tree species in the school grounds. Label each tree (A, B, C and D). The teachers will explain the methods used by scientists to identify trees including whether they are deciduous, evergreen, their height, structure, leaf shape, fruit and flowers. The children are divided into groups and assigned their tree. The children must use the ID guides/key provided and examine the structure and leaves of the trees with the help of a teacher. The children are then asked to share their results by stating which tree (A-D) they think is their species and how they came to that conclusion.

Resources for identifying tree species can be brought/downloaded from the following links:

- <http://www.field-studies-council.org/publications/pubs/tree-name-trail.aspx>
- <https://www.woodlandtrust.org.uk/mediafile/100703496/leaf-id-sheet.pdf?cb=25550be66d1d41daacb2200c1282deea>
- <http://www.woodlandtrust.org.uk/mediafile/100703484/autumn-leaf-id-sheet.pdf?cb=d3a5e40cecd5450f86d2bd9c03c44258>
- <https://www.woodlandtrust.org.uk/naturedetectives/activities/2015/09/twig-id/>

Indoor activity (if too wet to go outside): Students are divided into groups and given an assortment of pressed leaves to identify using the leaf chart and ID guides. The groups can then share their answers with the whole class and discuss any misidentifications about how this could have happened.

Identifying the parts of a tree (15 minutes)

Teachers will produce large pictures of a tree and ask the children in their groups to label the different parts and functions. Tree functions worksheets can be downloaded from

(<http://dryproject.co.uk/about-the-project/citizen-science/urban-and-rural-trees/>). The teacher will explain the meaning of drought:

Drought is a normal event that takes place in almost every climate on Earth, even the rainy ones. Droughts occur when a long period of abnormal dry weather lead to water shortages. Scientists believe that summers are going to get warmer and drier, this affects plants because it is much harder for them to suck the water that they need to grow out of the ground. The human body is made up of 60% water which we need to keep us healthy. Plants are also mainly made up of water just like us. If the trees don't have enough water what do you think will happen to them?

Ask the children in their groups to list three things they think will happen to their tree during a drought. The groups will be asked to feedback their results to the class.

Impacts of drought on trees

Branches: The branches may stop growing or die at the top of the canopy which can lead to insect attacks and disease problems, as well as broken and fallen branches.

Leaves: The leaves might be smaller in size due to a lack of growth. On deciduous trees the leaves might turn yellow or brown and start to curl inwards. Deciduous leaves may turn brown from the outside edges inward and in between the veins ("scorch") because these areas have the least amount of moisture in the leaf. Evergreen needles brown from the tip downward or turn yellow, red or red-purple. Damage may be concentrated around the top of the tree and the tree canopy may appear thin. The trees can drop their leaves earlier in the season to prevent losing water through the leaf surface.

Flowers and fruits: Flowers fail to open properly, flowering period is shorter than normal, and the fruit drops earlier. Fruit and seed production may be reduced or absent.

Trunk: Trees might show a decrease in growth or have no growth affecting the girth and height of a tree.

Roots: Dry roots, more vulnerable to roots diseases and root death from dehydration.

Bark: Begins to crack and more vulnerable to insect attack e.g. bark beetle during drought in California.

Measure tree girth and height (20 minutes)

The teacher will explain how scientists measure trees to track their growth and in response to changing climatic conditions:

Do you know how tall you are? Scientists do the same for trees they measure the tree's fatness (the girth) and height to look at changes in the growth of a tree. We can also measure the girth and height to see how tree growth might be affected by the changing weather. We want to measure the girth and height of a tree to look at how the weather in the UK might affect the growth of trees on your school grounds. Today we will show you how to measure the girth and height of a tree.

The teachers will demonstrate to the children how to first measure the tree girth. The tree girth will be measured at 1.3m (show them a metre stick with the measured height) and demonstrate how to use, measure and record the girth. Students will be divided into groups and asked to measure the same tree they worked with in the last exercise. The children will read and record the measurement on their worksheet. The group will then return to the base and the teachers will show them how to measure the tree height. The children will be shown how to use a clinometer to measure the height of a tree at 45 degrees.

One person must walk away from the tree, so they are far enough away to see the top of the tree with the clinometer reading 45 degrees and must mark the spot they are standing on. Another person must measure the height of the person holding the clinometer and the distance from the spot they are standing to the base of the tree in metres. Get the children to calculate the height of the tree (for example if the distance from the tree is 4 metres and child with the clinometer is 1 metre tall, the height of the tree is $4m+1m = 5m$). In groups the children should take it in turns to walk away from the tree and note down their observations on the team sheet which can be downloaded from (<http://dryproject.co.uk/about-the-project/citizen-science/urban-and-rural-trees/>). The students will then all come back together in their groups and the teacher will ask them to call out their recordings. If the measurements for the same tree are different, the teacher will ask them why they think the measurements are different.

Indoor activity (if too wet to go outside): The teachers draw some large pictures of trees and stick them to the wall. The children can measure the heights of the tree using the same methods.

Measuring crown spread of a tree (10 minutes)

Children are split into groups of five. The teacher stands under the tree and from the centre of the tree trunk marks down the N, S, W and E directions. The children must then walk in a straight line along this direction until they are positioned just under the furthest branch from the tree trunk. One person then measures the distance from the tree trunk in each of the direction and records the results on the team worksheet.

Extension activity: the seasonality of trees (15-30 minutes)

The teacher asks the children if trees look the same all year round? What changes do they notice? Children are then given four images of a tree and asked to draw and colour in the tree to show what it looks like in spring, summer, autumn and winter.

Have the children take pictures, describe it in their journals, take photographs and note down the following information: The children choose a tree on the school property and for a few weeks in each season spend some time observing it.

Date of flowering: the day when they can see at least five flowers on the tree with the petals sufficiently opened to see inside the flower.

Date of bud burst: When the green of new leaves is seen protruding from between the scales of a bud.

Date of fruit ripening: When at least five fruits e.g. conkers or acorns fall from the tree.

Date of last leaf fall: Record when most or all of the leaves have fallen from the tree.

Follow-up survey Tree Survey (40-50 minutes)

Students can be divided into teams of 6 so they are prepared for the field survey and in pairs given a role to play:

- **Recorders:** responsible for recording all information on the recording sheet.
- **Identifiers:** responsible for identifying the tree type (deciduous or evergreen), taking leaf samples and a photograph of the tree.
- **Managers:** responsible for overseeing the team, holding the plastic bags of leaves and helping out where necessary.

The recording sheet is shown (downloaded from <http://dryproject.co.uk/about-the-project/citizen-science/urban-and-rural-trees/>) and discussed with the students so they are clear with what they are to do. Students are taken out onto the school grounds or a local park to collect information about a specific tree in their groups. The teacher will need to note down the location of the tree (the tree could be numbered and marked and later identified on the map by the teacher <https://uwe.maps.arcgis.com/apps/GeoForm/index.html?appid=e7bd56d8ce984e0292c59010e353e7a3>). Alternatively, the recorders could make a sketch map of the area and notes about where the trees were positioned. Students can also use a global positioning system (GPS) or mobile phone application to note your location (<https://play.google.com/store/apps/details?id=com.qbiki.gpscoordinates&hl=en>.) Identifiers can try and determine whether the tree is deciduous or evergreen, take samples of the leaves, leaf rubbings and photographs of the tree (if a digital camera per group is not possible then the teacher can take responsibility for taking photographs of each tree identified in the area). Recorders will write the information down on the recording sheet. The identifiers and managers can work together to measure the diameter, height and crown spread of the tree with the details written down by the recorders.

Optional activity

Over the spring, summer, autumn and winter get the groups to return to the same tree and note down the date of flowering, bud burst, fruit ripening, and date of last leaf fall.

Classroom: Uploading the data on a computer (10-20 minutes)

Each team could input all the information they collected themselves for their tree by visiting (<https://uwe.maps.arcgis.com/apps/GeoForm/index.html?appid=e7bd56d8ce984e0292c59010e353e7a3>). If uploading the data onto the DRY website is too difficult for the students, the data upload could be demonstrated by the teacher alternatively, the information could be uploaded by the teacher or a student volunteer at a later stage.

The data could also be reproduced in a table format on the white board or typed up on a spreadsheet and viewed on a projector for the entire class to see. Hold a discussion comparing the different tree measurements and use the data to construct bar charts from the findings. Repeat the measurements in spring, summer, autumn and winter for the same trees and see how the measurements have changed. As a class, make a list of at least three weaknesses of the enquiry process and further discuss what you would do differently to improve the enquiry process. The data could also be uploaded onto the Treezilla website (<http://www.treezilla.org/map/>) and used to calculate the ecosystem benefits of the trees in your school grounds to mitigate climate change and used to reinforce the importance of trees in your local area.