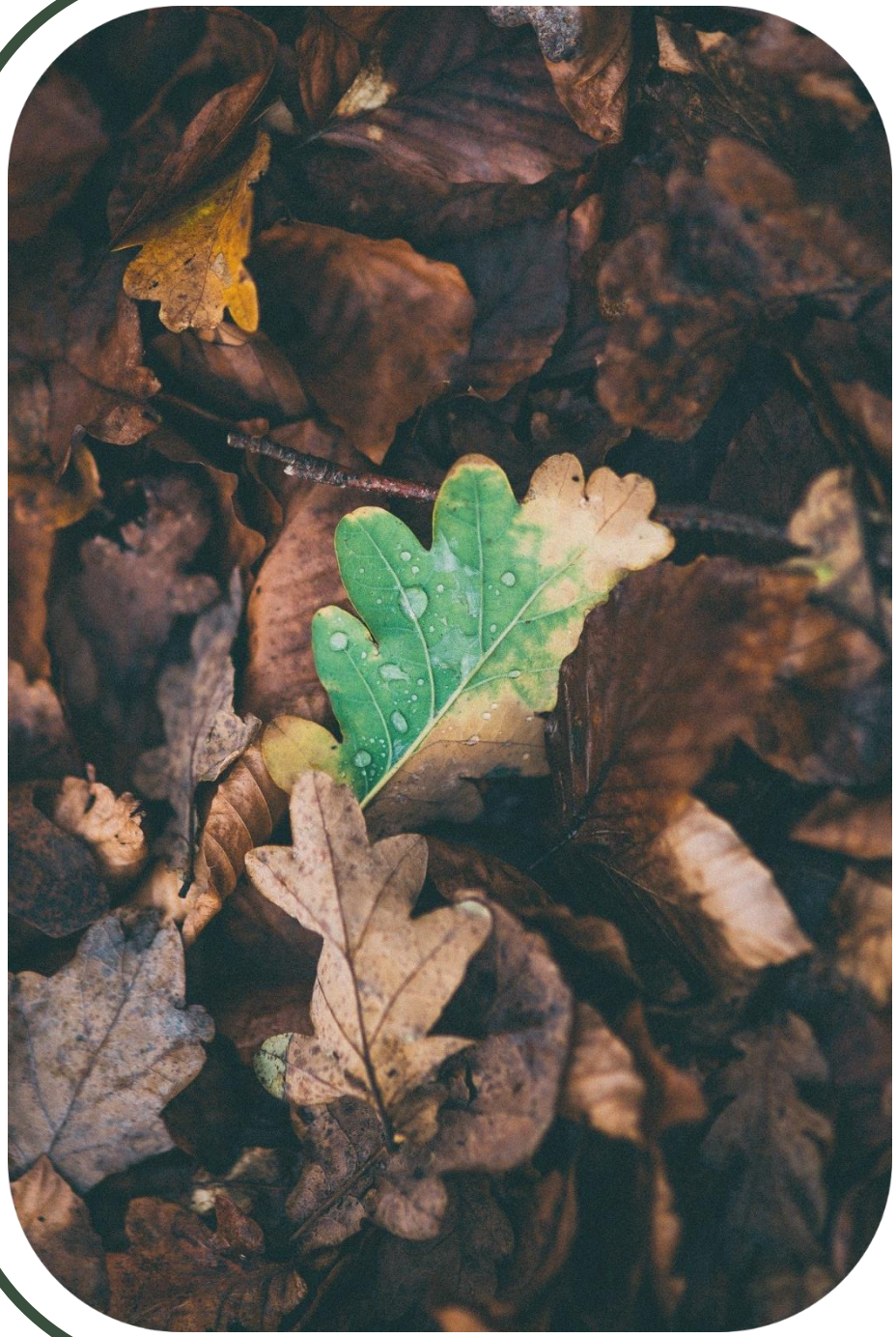
Nutty Maths!

A selection of outdoor maths-related activities to for students aged 9-12 years

Scotland: Second (P5, P6, P7)
England and Wales: Year 5,6,7
Northern Ireland: Year 6,7,8

Trees for Life



Learn with Leaves

How many patterns can the students spot outside? Can they make some of their own using natural items?

Look closely at the patterns found in nature. Are there any patterns to the way branches, leaves, seeds, flowers or petals are arranged on trees and plants?

Autumn is a great time to do this. They can collect different colours, shapes and sizes of leaves and create their own patterns, sort them into categories and look at symmetry in leaves and flowers.

Can they work alone or in groups to create some natural artwork?

Create one side of a picture and ask the students to complete the other side in symmetry, or get them to do this in pairs or groups. Can they create patterns with more than one line of symmetry?

Use fallen leaves to form equations with twigs or chalk to make the functions. Give each type of leaf a value e.g. oak leaf = 5, beech leaf = 2 and so on, and give the students equations to solve, or give them an answer to make up an equation for. This helps with maths skills and leaf ID!

Maps and Directions

Create a simple map of the school grounds, or local park (or your garden), and set up a trail of objects or markers around the area, marking each one on your map. Alternatively choose natural features such as particular trees, bushes or rocks instead. At each point leave something to be collected, part of a code, a question to answer, or tree or plant to identify. Ask the students to use the maps to find all the points marked.

This can be done with or without compasses. Just make sure your map has a north arrow, and tell them which way is north with a landmark to remember it by. They can orientate their map using this, and by using the features they see around them that are marked on the map.

To find their direction of travel all they need to do is:
1. Orientate the map
2. Work out where they are on the map, and decide where to go next
3. Trace a line on the map between where they are and where they want to go, then keep the line going off the map and point in the direction of the line they have traced – this is the direction they need to go in to find their chosen point!

Once students are comfortable with reading maps (paper and/or electronic), get them to make their own treasure maps for others to follow, and even use real maps to plan an adventure to go on together!

Minibeasting

Find out what minibeasts live in different environments – woodland, tree bark and leaves, leaf litter, old walls, vegetable beds, and meadows.

You just need some simple equipment - spoons or paintbrushes for gently scooping up the tiny animals to get a closer look, and trays, magnifying pots, or even washed-out yogurt pots to place them in to take a closer look.

Be sure to keep them out of sunlight, and put them back where you found them once you've had a good look.

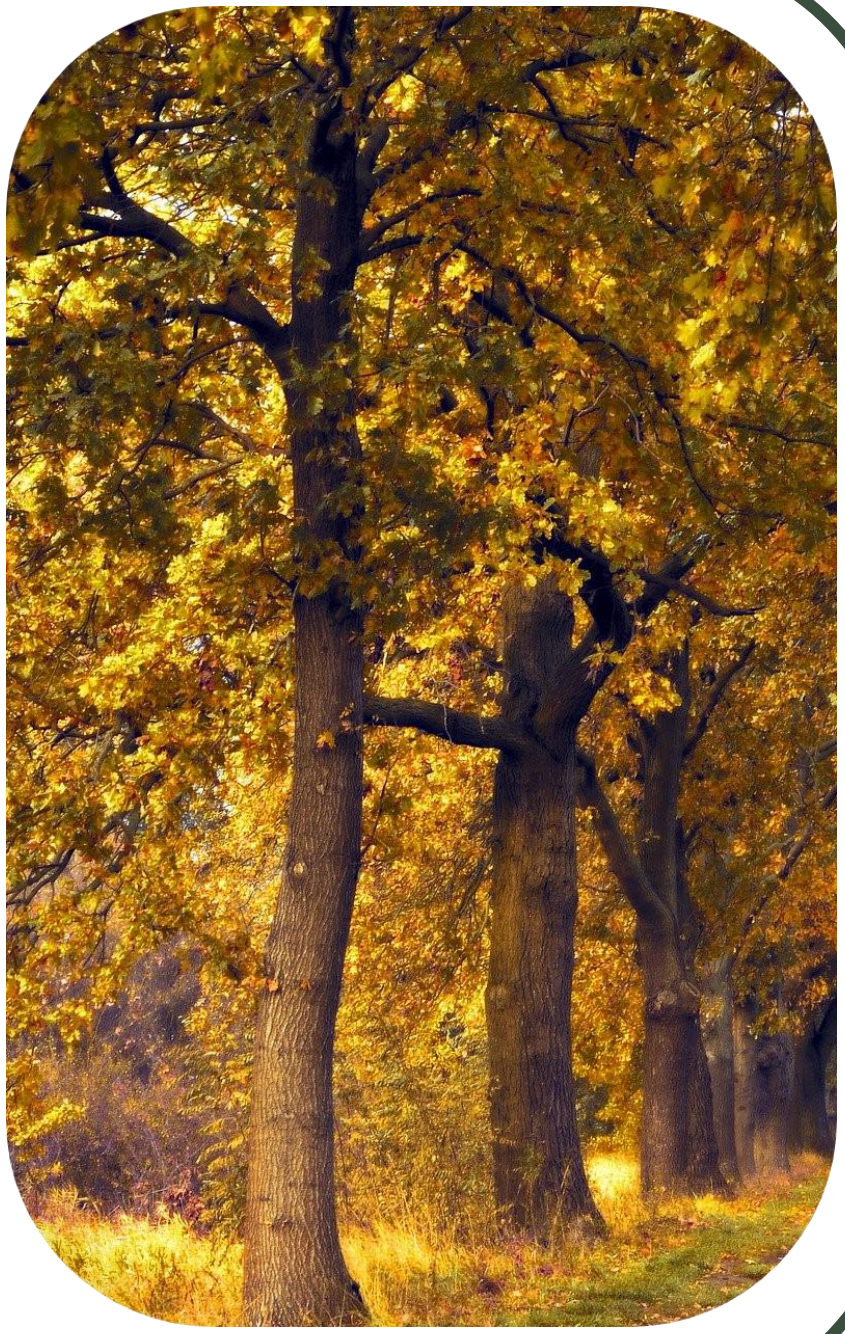
Try to identify what you find using books or guides. Look at things like how many legs do the creatures have? Is their body all in one piece, or in segments? What colour and size are they, and where were they found?

Sort the minibeasts into categories based on their characteristics, with the students deciding together how best to do this.

Create logs or tallies of how many minibeasts are in each category from each habitat and make graphs, charts or pictograms to display the results.

Compare the graphs from different habitats – are there any trends? How are the numbers and types of minibeasts found affected by different seasons, or weather conditions?

Tremendous Trees



Using some simple maths, work out the height of a tree, then measure its circumference to estimate the age of the tree.

There are a few ways to estimate the height – some more accurate than others!

Walk away from the tree trunk, stopping every so often to bend forward and look at the tree between your legs. Stop at the point where you can just see the top of the tree. Measure the distance along the ground from you to the tree using a tape measure or trundle wheel. This is approximately the height of the tree! Get several students to do this and see what range of answers you get.

Find other ways to do this on www.wikihow.com/Measure-the-Height-of-a-Tree.

To work out the age of the tree, estimate with arm spans, then measure the circumference with a tape measure. Roughly every 2.5cm of circumference represents 1 year of growth (though this varies by species). So, to estimate the age of the tree in years, divide its circumference by 2.5.

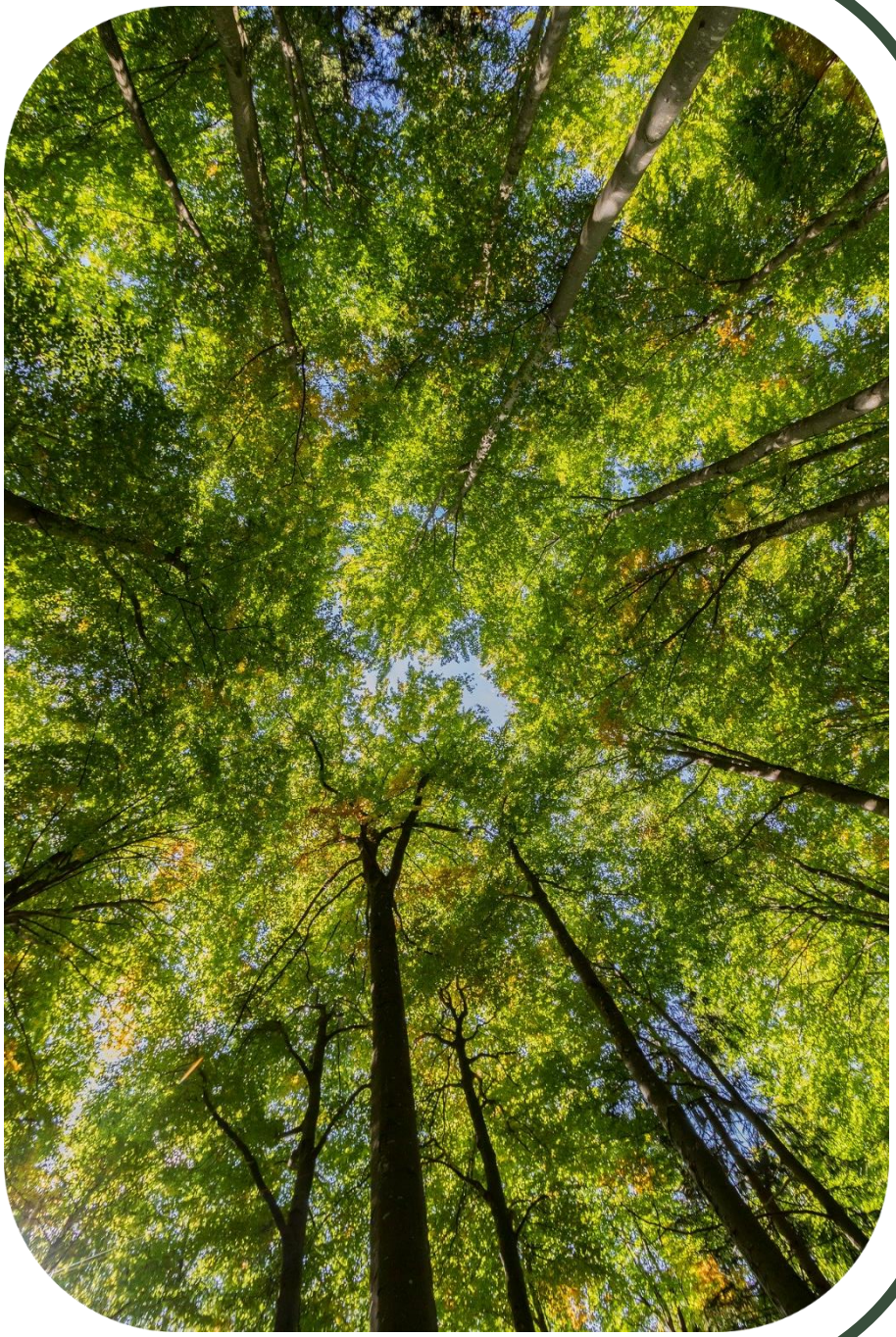
Can they find the oldest and youngest trees? Can they measure a few trees to find the average age?

Can the students find a tree their age?

Some students may also be able to work out the area of a cross-section of the tree's trunk by plotting the circumference on graph paper.

Those who are confident might be able to find the volume of the trunk using this area and the trunk height.

Canopy Calculations



This activity ties in well with learning about photosynthesis, and with the tree size and age calculations in the previous activity. Get the students to make estimates before deciding how to get more accurate measurements, then compare the estimates to the answers.

How close do trees grow to each other? Measure with footsteps, tape measures or trundle wheels and plot them on a map or on graph paper.

Compare the shape or area of different tree leaves – what might the size mean for photosynthesis, and how do trees maximise the amount of sunlight they can capture?

While there are still leaves on the trees, look at the canopy – how much is covered by leaves and how much is open, letting light through? Use grid paper to plot this and work out the perimeter and the percentage of canopy coverage.

Do this for different trees and compare them – do different trees have different canopy sizes?

Does canopy size or coverage depend on a tree's age or species?

Are there any other ways to work out the area of the canopy?

Nutty Maths problems

Create some squirrel and nut themed maths problems for the students to solve, using a range of answer formats involving percentages, fractions and decimal fractions. They could even use real nuts, leaves or other natural objects as props to help to work them out.

Here are some examples:

- Red squirrels love to eat hazelnuts. They know that they will need food over the winter, so they store some of the nuts they find. If a red squirrel finds 100 nuts, and it buries 50% of them and eats the rest, how many nuts has it buried, and how many has it eaten?
- If it finds 160 nuts and buries 25% of them and eats the rest, how many has it buried and how many has it eaten? Can you express these amounts in a simple fraction?
- Of these buried nuts, imagine that 75% germinate and become hazel saplings. How many hazel saplings has the squirrel helped to plant? Can you express the proportion of hazelnuts which germinate as a simple fraction? And a decimal fraction?
- Red squirrels spend around one third of their foraging (looking for food) time on the ground. If they are foraging for 12 hours a day in the summer, how many hours do they spend on the ground?
- Safia Squirrel has collected 60 nuts. For every two beech nuts, she has four pine nuts. How many are beech nuts?

Data and Graphs

There are so many options in the outdoors for making predictions, taking measurements and displaying data. Different kinds of graphs work best with different kinds of data; get the students to think about the best ways to present each type of data, thinking about how the graph will be used.

Take a look at the weather forecast, make predictions, then measure rainfall over a series of days or weeks. Log and graph the results. Did they match the forecasts? You could even start a school data log so that future students can compare their results to past students' results and look at change over time.

Plant a seed and watch it grow, taking measurements at regular intervals. Compare the rates of growth of different plants, or different species. You could also compare rates of growth of the same type of plant in different soils, or with different amounts of light. Introduce the control of variables here, varying one thing at a time, to give clearer results.

Do the angles of flowers, leaves or plants to the sun change throughout the day? How could this be measured?

Data can also be collected on things like temperature, wind speed, tar spot fungus on sycamore trees (does this relate to distance from roads?). Plot these to see change over time or make comparisons.

Thanks for reading, we hope you enjoy these activities! Be sure to take a look at our website where you'll find more resources and lots of information about our different projects and the flora and fauna of the Caledonian Forest.

You can also find updates, photos and videos on Facebook, Twitter, Instagram and YouTube!

Trees for Life | Rewilding the Scottish Highlands
Ath-fhiadhachadh na Gàidhealtachd