KS1 Outdoor Maths Opportunities

For pupils in or working at KS1 level

How to use these resources

The aim of these slides is to provide practical ideas to take curriculum maths learning outside the classroom.

Please take and adapt these ideas in any way that suits you and your class. You may need to tweak an activity to suit the needs or numbers of your cohort, or you might see an idea for a different area that you feel would work in your current topic. The hope is that there is the flexibility to make the resources work for you.



The activities can be as quick or extended as you choose. They can be used as starters, main activities, plenaries, revision lessons or intervention sessions.

Learning outdoors does not have to be the whole hour, but taking an activity outside and interacting directly or indirectly with the outside space around you can provide a different perspective and approach for all pupils, particularly those who might find it difficult to engage in a classroom setting.

Set yourself an achievable target: can you deliver an outdoor maths activity once a half term, fortnightly or even weekly? Making the outdoors an extension of your classroom builds confidence in both teachers and learners, and an understanding that this can be another space where we learn.

Contents

⇒ Number and Place Value

⇒ Addition and Subtraction

⇒ Multiplication and Division

⇒ Fractions

⇒ Measurement

⇒ Geometry

⇒ Statistics (Year 2)

Number and Place Value

Greater than/less than

Using sticks, pupils can create their own greater than/less than symbols.

They then use natural objects to fit inside these, allowing them to visually see which value is greater or smaller.



Language focus: “6 is greater than 3.”



Language focus: “4 is less than 9.”

Doubling

Use natural items to practice doubling.

Pupils could work in partners, with one counting out a number, then asking their partner to double it.

A chart, like the one opposite, could be set up for pupils to complete or drawn on the ground using chalk.



Place value in 2-digit numbers

Swap Base 10 for natural objects: pupils practice representing tens and ones using, for example, 1 stick = 1 one and a bundle of 10 sticks = 1 ten.

Alternatively, pupils could use another object to replace a bundle of 10 sticks (e.g. a large rock).

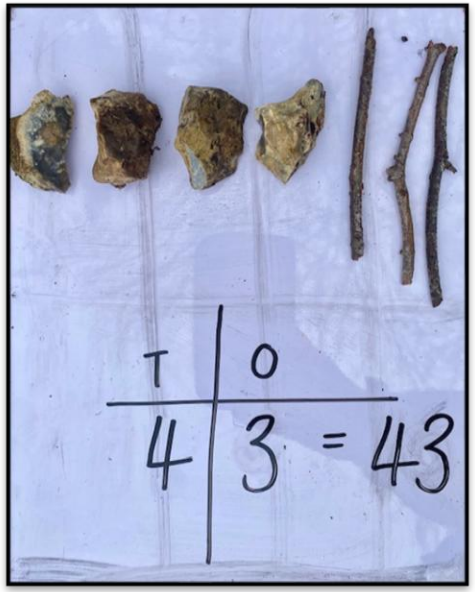
So, 35 could be represented by 3 bundles of ten sticks + 5 singular sticks, or by 3 large rocks and 5 singular sticks.

Can they use these representations to reason which values are greater than/less than one another? Can they prove it?



Language focus: "This number is 16. The 1 shows we have 1 group of ten. The 6 shows we have 6 extra ones."

Language focus: "This number is 43. The 4 shows we have 4 groups of ten. The 3 shows we have 3 extra ones."



Partitioning to count/write additive equations

Choose two natural resources and tell pupils that one object represents tens and the other represents ones.

Ask them to find the total value for amounts with different numbers of tens and ones.

Once confident, ask pupils to record the corresponding additive equations on whiteboards. They may combine the tens and add this to the combined value of ones, or they may add each ten and one separately.

Ask pupils to consider what is the same and what is different about each set of equations, and which demonstrates the most efficient method of calculation.



Pupils could record the equation as:
50 + 7 = 57
or
10 + 10 + 10 + 10 + 10 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = 57

NB: Vary the natural resources used to represent ten. A bundle of ten sticks can be used for those less secure, but also ensure pupils are familiar with one object representing ten regardless of size, which they will encounter with place value counters and 10 pence coins.

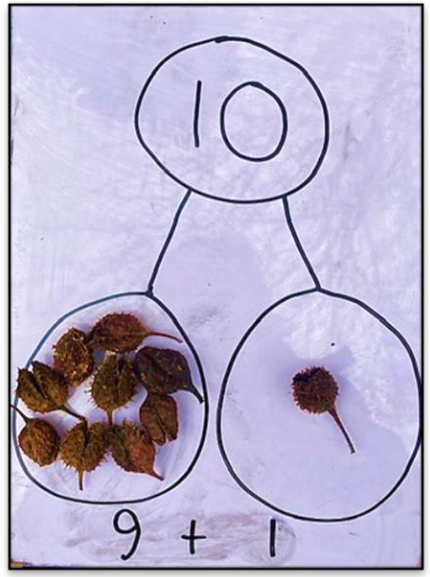
Addition and Subtraction

Number bonds

Create part-whole models, either on whiteboards or on the ground using chalk.

Encourage pupils to use a selection of natural objects, as they would manipulatives, to help them solve equations. These could also be recorded in chalk.





Challenge:

Could pupils work systematically to find all the number bonds to a given value(s)?

Composing numbers to 10

To support missing value questions, collect objects from the outside area to use as manipulatives.

Use questioning such as:

“I am holding 7 acorns altogether.
How many acorns are there in my closed hand?”

Pupils work in partners in the outdoor area practising their reasoning verbally.

Once confident, they can start to record their equations on a whiteboard.



Addition as aggregation

Use natural objects to provide real-life contexts within an abstract numerical situation:





"There are 2 flowers in one bunch. There are 3 flowers in the other bunch. There are 5 flowers altogether."

"We can write this as 2 plus 3 is equal to 5."

"The 2 represents the number of flowers in one bunch."

"The 3 represents the number of flowers in the other bunch."

"The 5 represents the total number of flowers."

Language focus taken from DfE Mathematics guidance: key stages 1 and 2

Multiplication and Division

Finding multiples of 2, 5 and 10 outdoors

Task pupils with finding items that represent multiples of 2, 5 or 10 in your outdoor area. These may be individual items (such as a flower with 10 petals or a leaf with 5 points) or pupils could collect individual items and create groups of the desired number.

Once pupils are confident with counting in 2s, 5s and 10s, you could add in an element of challenge by giving them a multiple for which they have to create the correct number of groups.



5 (petals) x 8 (flowers)



4 petals = 2 lots of 2



1 group of 2



1 group of 5



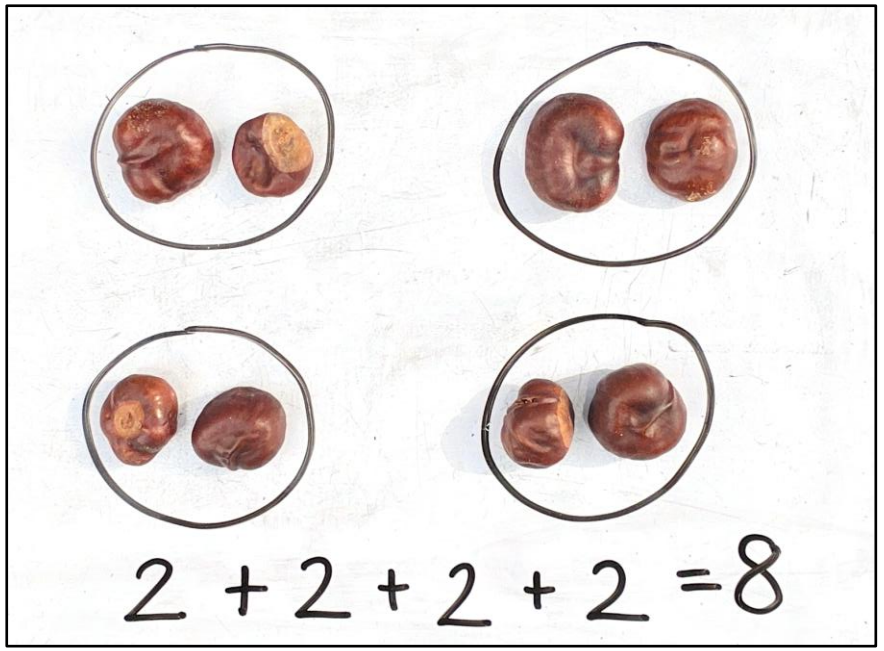
3 groups of 5



3 x 10 (firs on each stalk)

Repeated addition

Use natural contexts and resources to support pupils' understanding and recognition of equal groups.



Language focus:

"There are ____ equal groups of ____."

"There are ____ in each group."

"There are ____ groups of ____."

Encourage pupils to find the total number of items by skip counting/using times tables knowledge depending on their multiplication fluency.

Fractions

Fractions of shapes

Use sticks to make shapes and then divide these into equal parts to represent different fractional amounts.

Language focus:

“The whole is divided into ____ equal parts.

____ of these parts is shaded.”



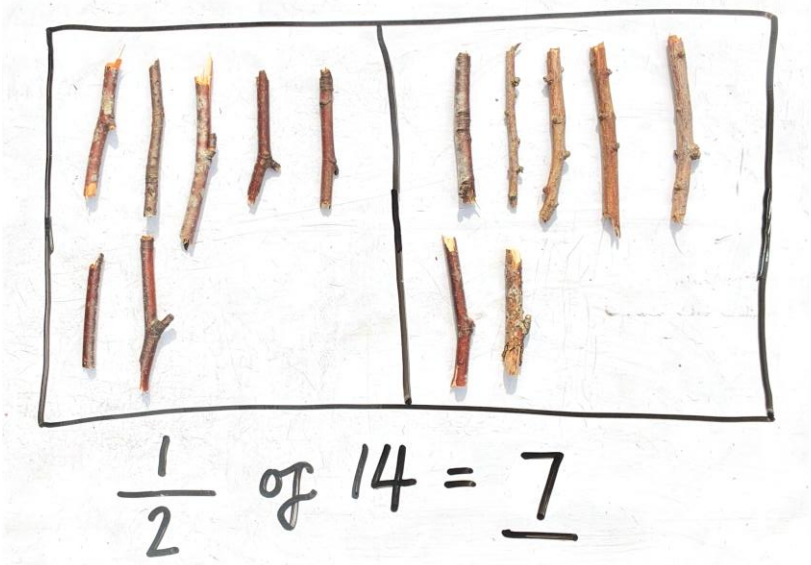


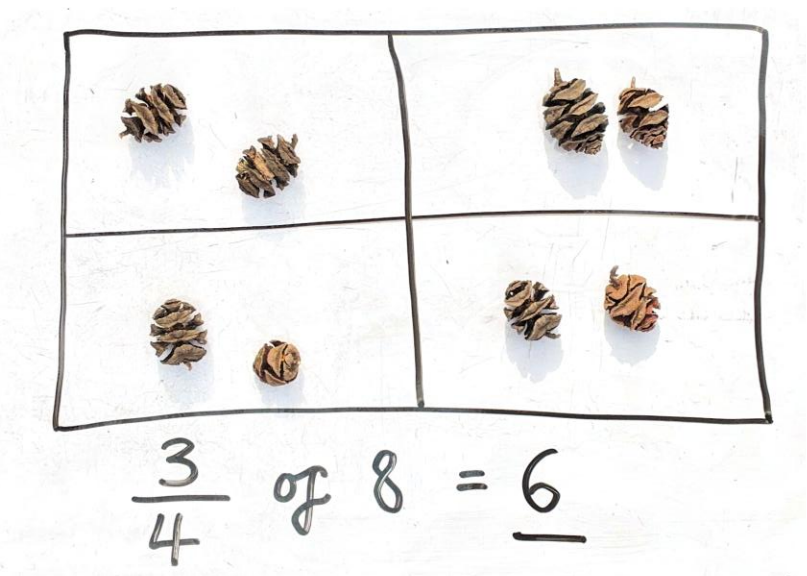


Fractions of amounts

Pupils collect a given number of natural objects and use these to practise sharing into equal groups.

They could create a sharing grid out of sticks or work on whiteboards as below:





Measurement

Non-standard units of measure

Pupils use multi-link or other concrete resources (e.g. glue sticks, pen lids, counters) to measure and record the height/length of different natural objects around the school site.

If appropriate, pupils can record their findings using a table, drawing pictures of the objects they have measured and how long or tall each one is.

Object	How many cubes?
acorn	1
flower	16
grass	7
leaf	5



The flower is _16_ cubes tall

Measuring in arm spans

What is the measurement of your playground in arm spans?

Have pupils line up around one side of the playground, each with their arms stretched out so they are standing fingertip to fingertip.

Mark the starting point and continue to move round the perimeter of the playground, measuring the entire time by pupils keeping their arms stretched out. You may want to do it so that one child moves at a time, i.e. the person who started the line would move to the end to continue the measurement, and so on.



Reading rulers

Take pupils outside with their rulers to practice accurately measuring and reading measures in centimeters.

For those who are confident, challenge them to read the measurement for objects that have not been started at 0 cm.

You could also ask pupils to find the difference between two of their measurements and/or use greater than/less than symbols to compare these.

How long is each leaf? What is the difference?





How long is the leaf?



Measuring weight and liquid



Provide pupils with containers, measuring cups/jugs and/or weighing scales to measure the weight and volume of various natural ‘ingredients’, such as petals, leaves and pebbles, to create potions.

They could follow either a given recipe or find the measurements for their own creations.

Geometry

Recognising common 2D and 3D shapes

“Pupils need to be able to recognise common shapes when they are presented in a variety of orientations and sizes and relative proportions, including large shapes outside the classroom.” – 1G-1 Teaching guidance (DfE)











Identifying irregular 2D shapes

Provide opportunities for pupils to run their fingers along the sides of irregular 2D shapes by building them out of sticks. Pupils can describe and compare these to standard polygons they are already familiar with.

You could task all pupils to create a 5-sided shape in any form of their choosing (not necessarily made with 5 sticks). How do we know that everyone has created a pentagon?



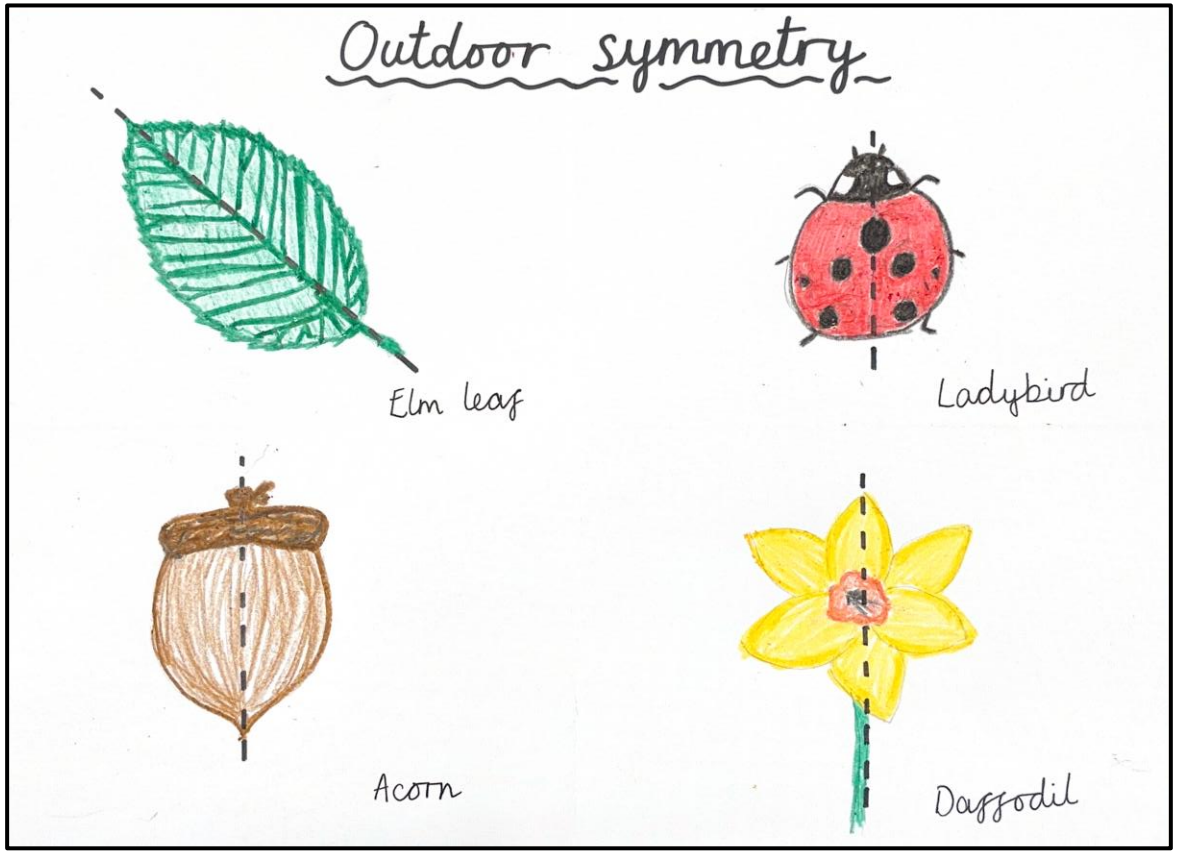




Symmetry

Take pupils outside to discover what examples of symmetry they can find in the natural world. You may want to provide sheets with specific examples to look out for, particularly if pupils are less secure with the concept of symmetry and what constitutes a symmetrical appearance.

You could also use bug pots (or similar) to allow for a closer study of the symmetry of any insects your pupils find.

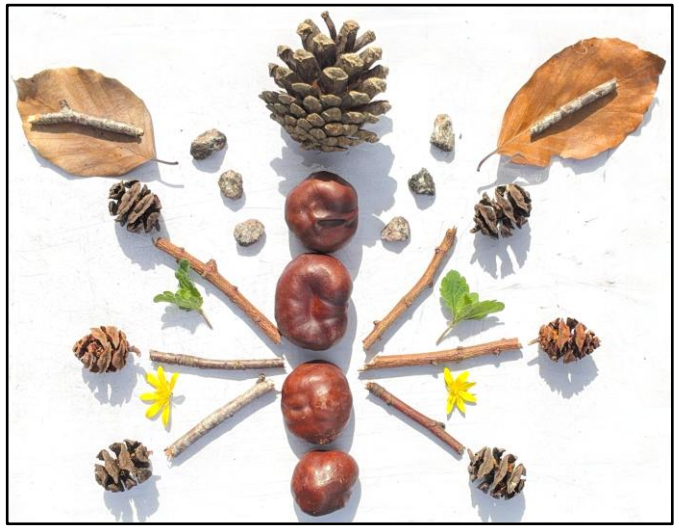


Symmetry in Mandalas

Allow pupils to create their own versions of symmetry and put their learning into practice. Working as individuals or in groups, task pupils with creating natural mandalas that demonstrate symmetry from a central point.

Pupils can be supported or challenged through the variety and number of items used to create their patterns.

You could make a link to statistics by asking pupils to create tallies of the items used in their mandalas.





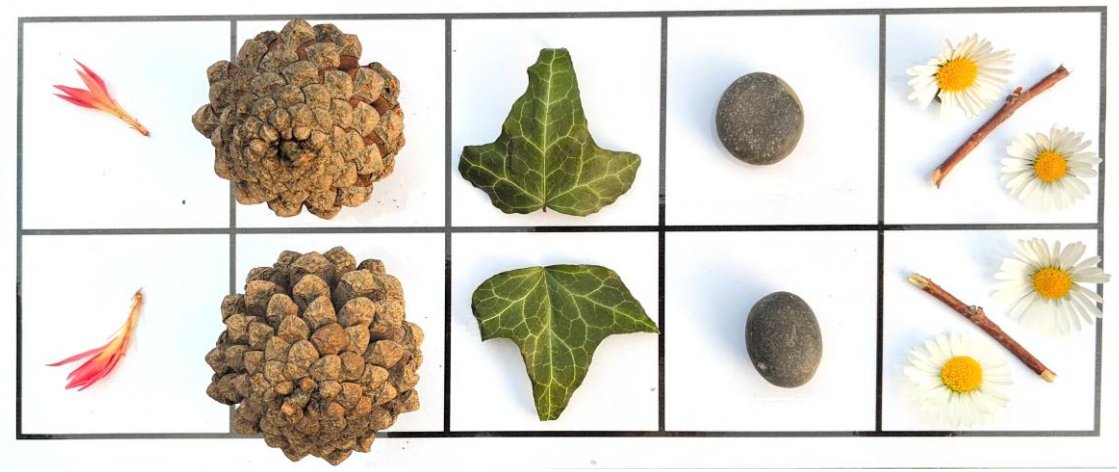
Make a nature mandala – Wildlife Watch

More symmetrical patterns

For days when it's very windy, use clay bases for pupils to capture their symmetrical creations in! Add faint lines to divide the shape in half or quarters before beginning, to support pupils' accuracy when adding their items.



Use existing resources like tens frames to support pupils to create simple symmetrical patterns:



The central line acts well as a mirror line to ensure the pattern is reflected correctly.

Position and direction

Ask pupils to collect different sticks and lay them out as a maze. They then navigate a partner through the maze, using either a pebble or another type of natural marker.

Encourage pupils to use the language you want them to develop, e.g.

- up, down, left, right
- clockwise, anti-clockwise
- north, south, east, west

A larger maze could be created for pupils to walk through themselves, following instructions and using directional language.

You could use similar activities for computing and/or orienteering tasks.



Statistics

(Year 2)

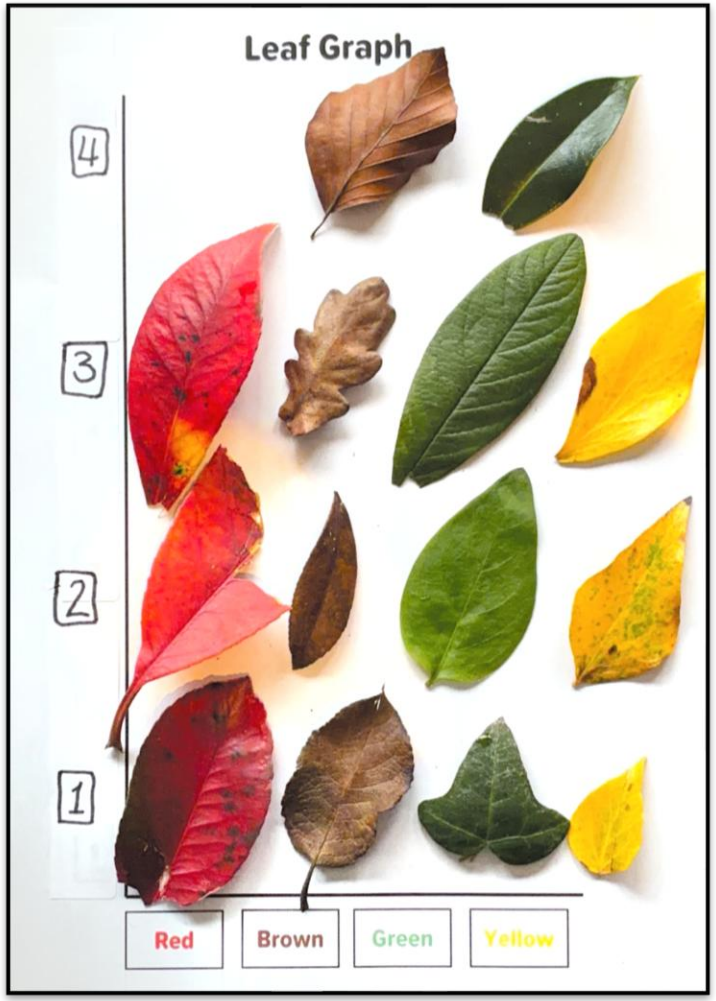
Leaf bar charts

In groups or as a class, ask pupils to collect leaves that have fallen and create bar charts using the leaves to make the bars.

NB: If pupils find it difficult to accurately compare the number of leaves due to leaves being different sizes, you can create the bars using multi-link cubes.

Possible ways of creating bar charts:

- Organise by colour
- Organise by leaf shape
- Draw on science learning and label the x-axis with the names of the trees using a leaf identification sheet/tool



Tally sticks

To support the skills of subitising and counting in 5s while developing an understanding of how to create tally charts, show pupils how they can use sticks to make tallies.

You could either call out a number and ask your class to create it using their tally sticks, or ask them to work in partners, creating and identifying numbers for each other.



Data collection

Once pupils are confident with creating tallies, take your class outside to collect data from around the school grounds. This could be examples of wildlife around the site; types of trees or plants; species of bird spotted, etc.

This data can then be turned into bar graphs.

Various sheets to support with identification are available **here**.



Insect	Tally	Number
ant	𝍸 𝍸 III	13
woodlouse	𝍸 II	7
snail	I	1
slug		0
bee		0
ladybird	𝍸	5
butterfly	I	1
spider	II	2

Introduction to Carroll diagrams

Autumn is the best time for this activity, when there are a range of types and colours of leaves on the ground. Ask pupils to gather a few leaves each. Gather everyone together once this has been done in a clear space.

Someone starts the sequence by putting one of their leaves down in the middle: 

The next person then puts a leaf beside it, changing only one attribute. For example, they could put down a leaf that is either a different colour, size or type of leaf.

In this example, the leaf and the colour are the same, but the size has changed: 

The next person decides to change the colour: 

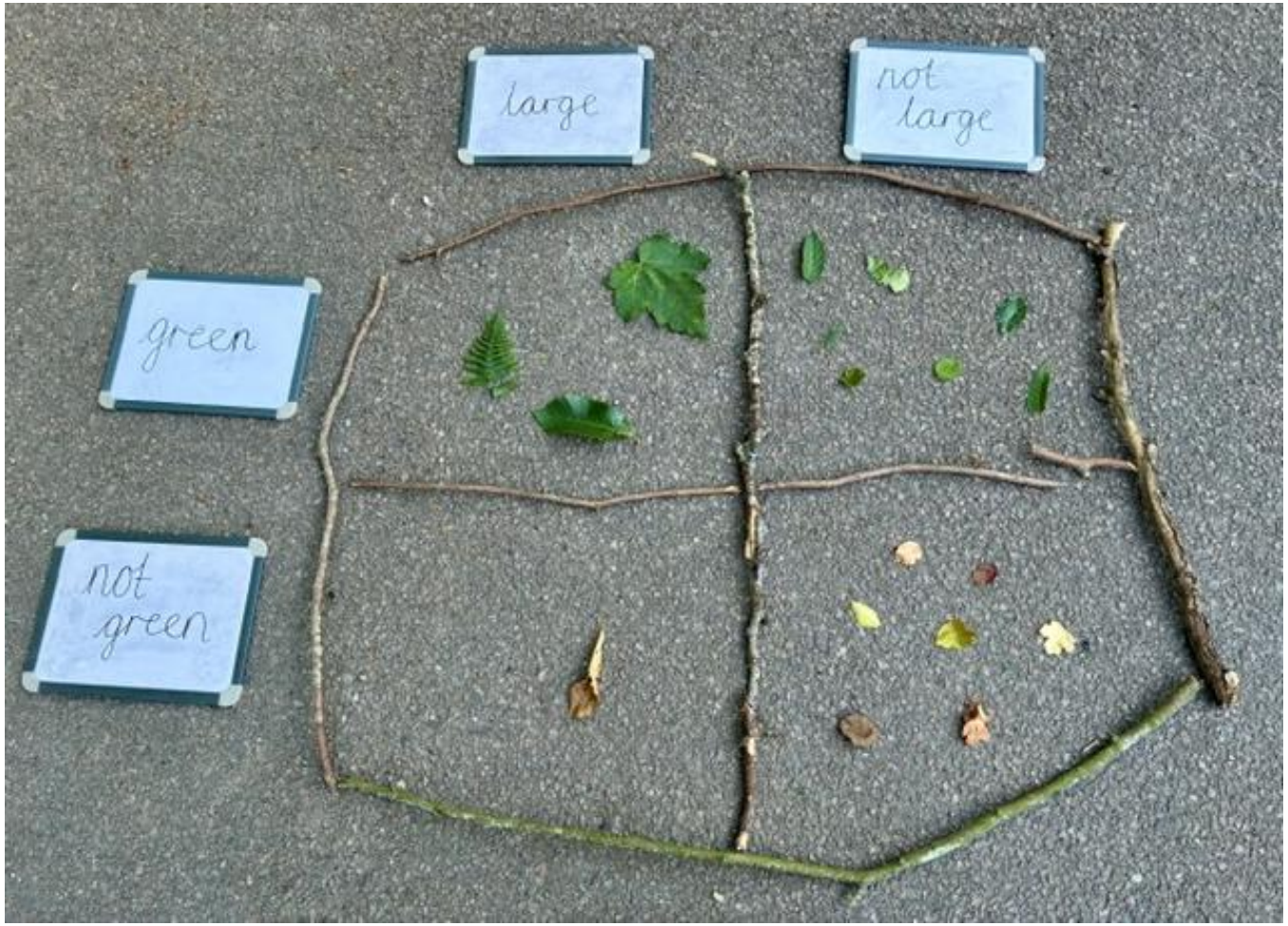
The fourth person to go now has the option to continue the sequence on the right- or left-hand side. For example, they could put down a small brown leaf from a different tree on the left, or a green leaf of a different size on the right.

Once pupils have got the hang of this activity, you can then introduce Caroll diagrams, which encourages sorting the leaves based on their observable attributes.

Leaf Carroll diagrams

As a follow-up from the previous activity, draw Carroll diagrams on large pieces of sugar paper for pupils to work on in groups or use sticks to create the diagram and use whiteboards to label the categories.

Pupils can now sort their leaves physically using their understanding of observable characteristics.



Human Carroll diagrams

To bring numerical values into pupils' understanding of Carroll diagrams, create a large diagram on the playground using chalk, big enough that pupils will be able to stand inside. Hand each pupil a number card (pre-sorted to ensure it fits the rules of your diagram) and ask them to stand in the correct box.

You can adapt the categories to fit what you are working on, including elements of shape or geometry, for example:



- Odd / Even
- Multiple of 5 / Not a multiple of 5
- Greater than 50 / Not greater than 50
- Digits add to 10 / Digits do not add to 10
- 2-digit number / Not a 2-digit number
- 4 sides / Not 4 sides
- Measures length / Does not measure length



The information and guidance provided by ZSL are intended for educational purposes only. Responsibility for the safety and supervision of pupils remains with the school and its staff at all times. Teachers should only undertake activities that are appropriate to their setting and must ensure that all activities are planned, risk assessed, and carried out in accordance with their school's policies, procedures, and safeguarding requirements.