KS1 Outdoor Maths Opportunities

Number and place value

Greater than/less than

Using sticks, pupils 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

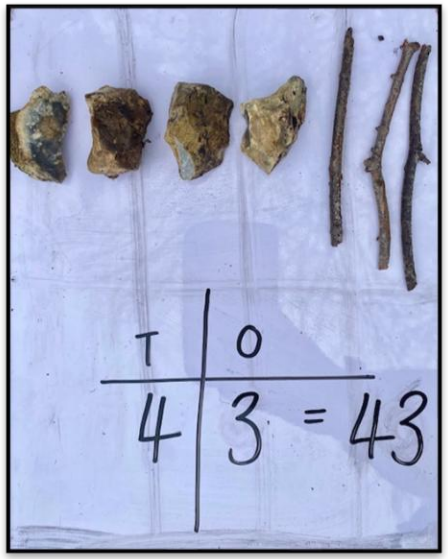
Swap Base 10 for natural objects: pupils practice representing tens and ones using, for example, 1 stick = 1 one and a bundle of 10 sticks = 1 ten.

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.

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.

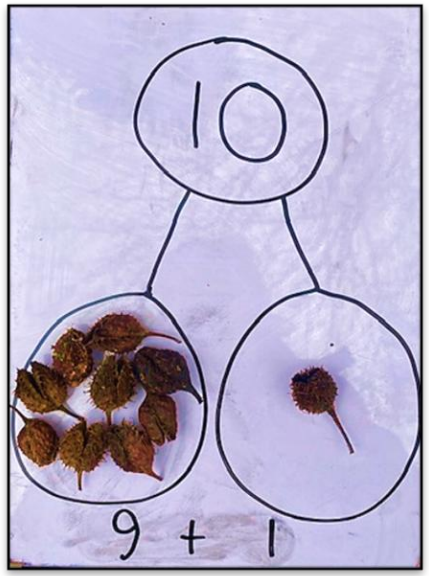
Pupils could record the equation as:
50 + 7 = 57
or
10 + 10 + 10 + 10 + 10 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = 57

Addition & 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:

“How many flowers are there altogether?”

“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 & division

Finding multiples of 2, 5 or 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

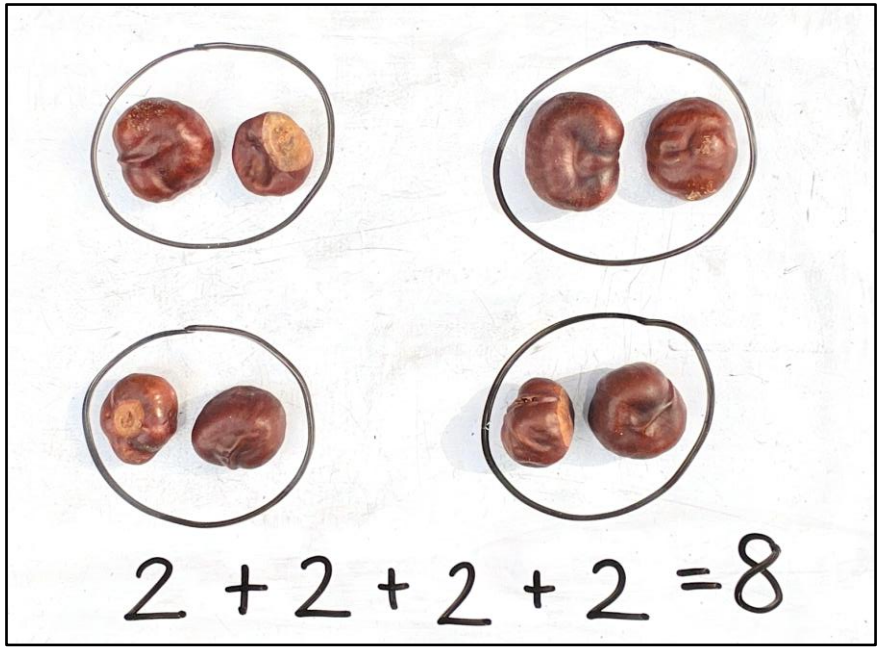
Use natural contexts and resources to support pupils' understanding and recognition of equal groups.

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 split shapes into equal parts and represent different fractions.

Language focus:

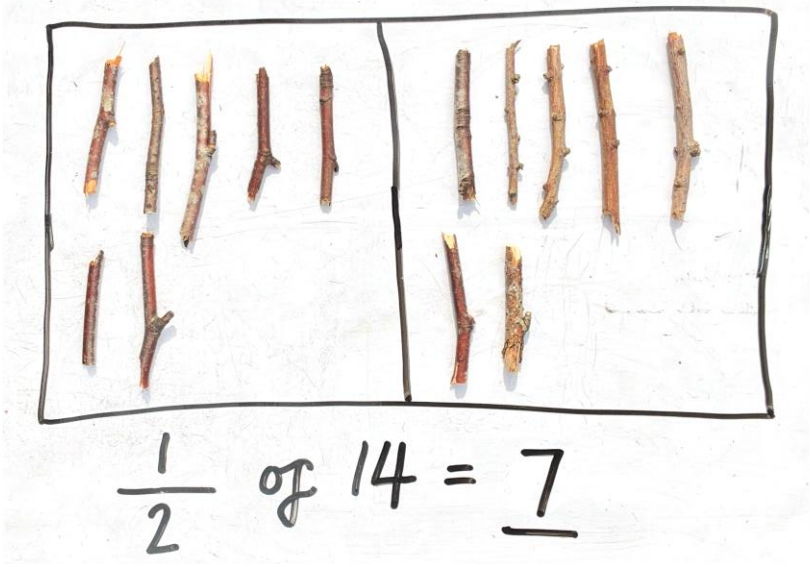
“The whole is divided into ____ equal parts.

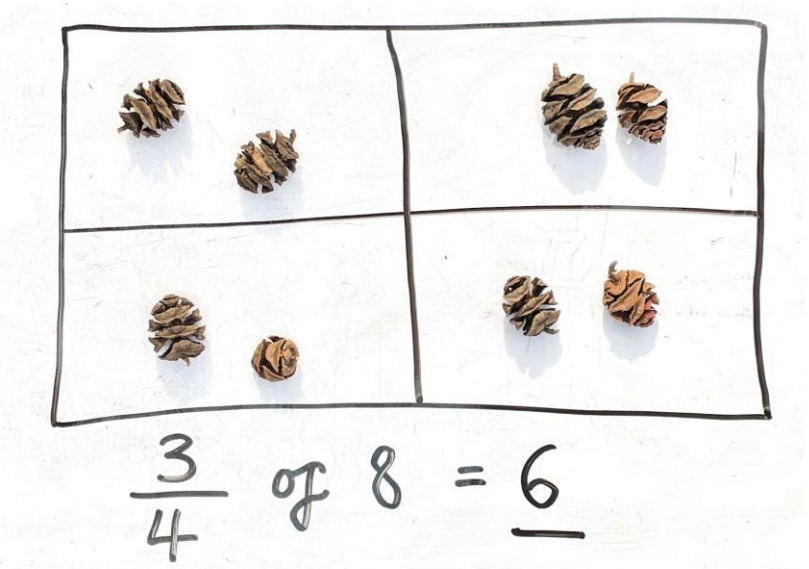
____ of these parts is shaded.”

Fractions of amounts

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

They could create a sharing grid out of sticks or work on whiteboards.





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, they can record their findings.

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 with 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

Provide pupils with 2D or 3D shape mats and allow them to explore your outdoor area to find examples of given shapes. These could be manmade, such as markings on a pitch or a basketball, or they could be natural objects, such as pinecones, petals or tree logs.

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?

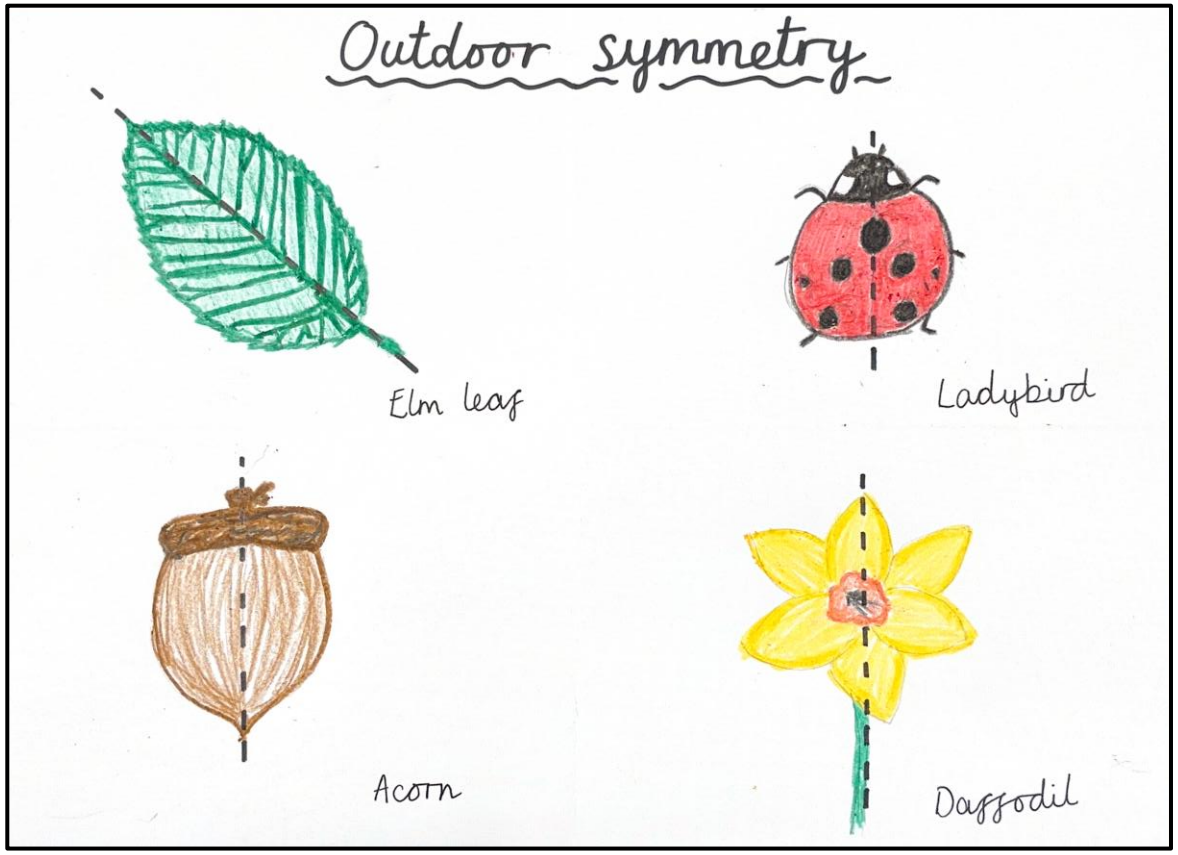




Symmetry

Take pupils outside to discover what examples of symmetry they can find in the natural world.

You may want to provide bug pots (or similar) to allow close-up study of symmetry in any insects found.



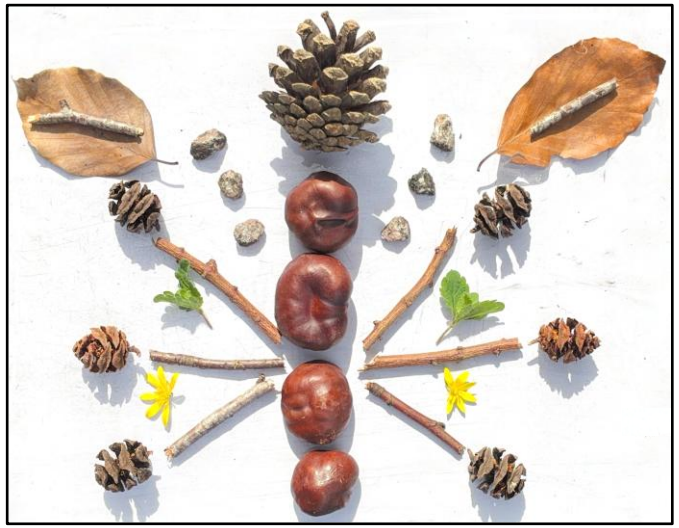
Symmetry in mandalas

To provide pupils with the opportunity to create their own versions of symmetry and put their learning into practice, ask individual pupils or groups to create 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.

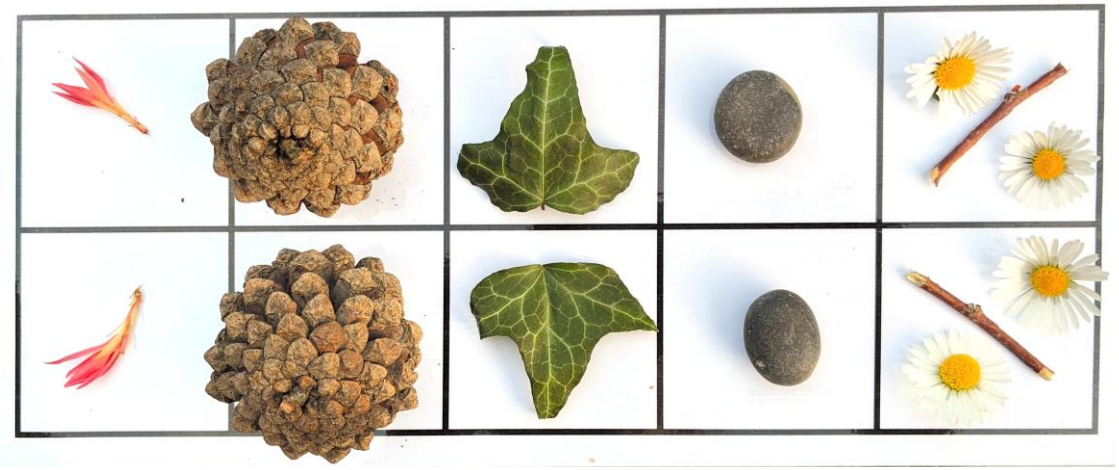
Make a nature mandala – Wildlife Watch



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 instruction and using directional language.

Similar activities could be used for computing and/or orienteering tasks.

Statistics

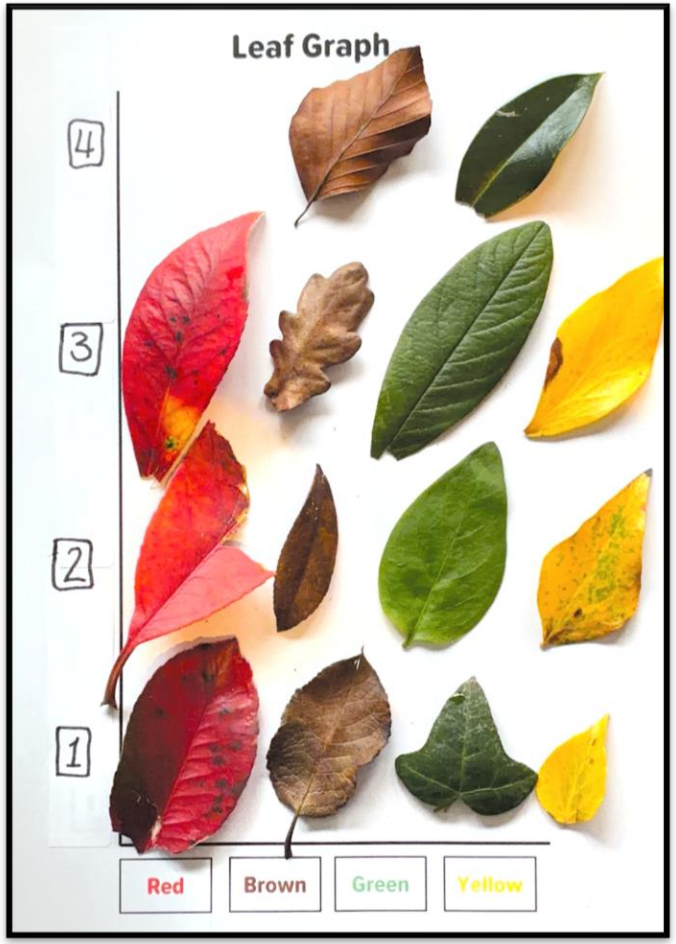
(Year 2)

Leaf bar charts

In groups or as a class, children collect leaves that have fallen and create large bar charts using the leaves to build and create the bars. Alternatively, if this is difficult to count, 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 subitising, counting in 5s and to develop an understanding of how to create tally charts, show pupils how to use sticks to create tallies.

Working in partners, pupils create values and identify the number their partner has created.

Data collection

Once pupils are confident with creating tallies, your class can start collecting data from your school grounds with which to create bar graphs.

This could be examples of wildlife around the site; types of trees or plants; species of bird spotted, etc.

Relevant identification sheets could be used to support this activity (see links on site).

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.

The first nominated person puts a leaf down in the middle: 

The next person then puts a leaf beside it, changing only one attribute. For example, the colour, size or type of leaf:

The leaf and the colour is still the same, but the size has been changed.

The next person puts down a leaf: 

The one attribute that has changed this time is the colour.

The next person could put down, for example, a different type of small brown leaf on the left, or another leaf of the same type and size on the right that is a different colour.
(If it is a windy day, put stones on top of the leaves to stop them blowing away.)

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.