

HIAS HOME LEARNING RESOURCE

Mathematics in the Garden

HIAS Maths Team
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Final version

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Overview



Maths in the Garden

The garden provides a range of unique maths opportunities within an engaging and exciting environment. It teaches problem solving, measurements, geometry, data gathering, counting, percentages, area, perimeter and many more aspects. The following suggests some fun and practical ideas that could be explored with your child as part of home learning. Ideas are taken from:

<https://schoolgardening.rhs.org.uk/>
<https://learningoutsidetheclassroomblog.org>
<https://nrich.maths.org>

Exploring 3D shapes (Early Years)

<https://nrich.maths.org/8860>

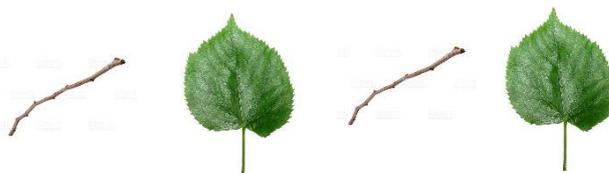
- **Children often** enjoy making footprints in soft materials
- **Parents could** use this idea to encourage children to develop an awareness of the faces of 3D shapes
- Your child could explore pressing natural materials such as pebbles, twigs, cones and flowers into soft earth
- Talk about experiences of making footprints in sand or snow. Encourage your child to select an object and to press it down into soft earth to make a 'footprint'
- Show how to run a finger around the edge of the impression to feel the perimeter
- Encourage your child to tell you about what they've made. Can they see other objects that might make the same 'footprint?' Look at the object and the 'footprint' side by side. What's the same? What's different?
- What will happen if we stand the object back in it's 'footprint?' How do you think this object made this 'footprint?'



Making and Describing Patterns (Early Years)

<https://nrich.maths.org/13250>

- **Children often** enjoy spotting patterns and making patterns with lots of different things, including themselves.
- **Parents could** provide a 'pattern of the day' with objects for children to copy, extend and create their own. They could make deliberate mistakes for children to spot
- Encourage your child to make an AB repeating pattern with a range of materials such as leaves or twigs or by printing and sticking shapes on long pieces of paper. They can progress to more complex ABB or ABC repeating patterns and to make growing patterns
- What do you notice about your pattern?
- Tell me about your pattern
- What is the same and what is different about this one and your copy?
- I wonder which one goes next? I think the next one is the green leaf – oh, you don't agree? Why? Can you explain how the pattern should go?



Symmetry Ideas (ages 4 – 6)

Symmetry is a really fun and easy topic to take outside with minimal preparation.

- Symmetry hunt – Find objects with 1, 2, 3, or 4 lines of symmetry. You could then get your child to draw their findings or take a photo of the objects
- Symmetry bugs – Why not encourage your child to design and build their own symmetrical bugs using sticks?



Number Recognition (ages 4 – 6)

There are lots of ways to look at number recognition in the outdoors. Children could collect and find a certain number of sticks, leaves or stones, in different sizes / colours.

- What about finding a simple number sentence with outdoor objects? For example 4 brown sticks + 6 green leaves?

Number cards are available as a free resource at the following link:

www.educateoutside.com/resource/numbers-1-10-outdoor-counting-and-simple-addition/



Shape Hunt (ages 4 – 6)

This is a really simple but fun activity for your little ones who are looking at shape recognition.

- Shape hunt - Get your child to go into your outdoor space and see which different shapes they can see in the area. Can they name the shapes? How many sides do they have? Could they begin to group the shapes?

Your child could then draw the different shapes that they see

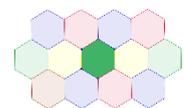


Tessellating Twigs (ages 5 – 7)

Tessellation is an arrangement of shapes closely fitted together, especially of polygons in a repeated pattern without gaps or overlapping.

Your child will need a collection of straight twigs or sticks for this activity. Collections of natural loose parts (pine cones, pebbles, feathers, leaves etc) could extend the investigation opportunities.

- An adult can trim sticks to a particular length with secateurs using a flat cut, and smooth the ends with sandpaper (for safety)
- Your child uses their twigs to line them up in size order and sort them according to length into groups of 3 for triangles, 4 for squares and 5 for pentagons etc...
- Create tessellated patterns on the ground using the groups of twigs. The results could be recorded on paper or photographed
- Mix up the lengths of twigs for further design opportunities with other shapes. Investigate shapes (regular and irregular) that will tessellate



Tree Exploration (ages 5 – 11)

The exploration of trees can provide a range of mathematical opportunities.

If you have a tree in your garden, or one that you can explore, why not try the following:

- Estimate (and measure – safety permitting) the height / girth of the tree
- Estimate the age of the tree
- Estimate the number of leaves on the tree – how could you calculate the number accurately?

Fruit harvesting calendar (ages 5-11)

Why not try encouraging your child to think about when British fruit is in season?

- Ask your child to think about fruit that grows in this country. Make a list of their answers
- Go through the list of UK grown fruit and discuss with your child when they think the fruit is ready to eat, or 'in season'
- Research using websites / gardening books etc to find out when the fruit is in season

- **Can you find the area of one of the leaves? What would the total area of the leaves on one branch be?**
- Explore the symmetry of the leaves...could you make a symmetrical pattern using leaf rubbings?



- Divide a paper plate (or draw a circle on an A4 piece of paper). Label each section into the four different seasons e.g. spring, summer, autumn, winter
- The seasons could also be divided into months
- Ask your child to draw or cut out photos of the fruit and place them in the right season section on the calendar to create their own harvest calendar



Measurements in the Garden (ages 7-11)

Perimeter is the distance around a closed shape. It is a linear measurement. Area is the space inside a closed shape. It is a square measurement.

- Ask your child to decide how they will measure the garden / outdoor area – e.g. measuring tape, piece of rope, own stride
- Decide whether part measurements will be rounded up or down, to simplify
- Measure particular parts of the garden or outdoor space. This could be a vegetable patch, raised beds, flower borders, a paved area, garden shed etc. Remember to measure any boundaries / perimeter fences
- Measurements could then be transferred onto cm squared paper; label the areas of the garden plan to show usage / purpose
- Work out the percentage of the total garden area for each purpose
- What if we wanted to include an extra border? Patio area?



Soil statistics (Fractions / %) (ages 7-11)

Have you ever wondered how much of our planet Earth is made up of soil?

- Use an apple to demonstrate how much of the Earth can be used for farming and growing food crops
- Ask your child to estimate how much of our planet Earth is made up of soil?
- Take a large apple which will represent Earth
- Cut the apple into quarters. The earth is $\frac{1}{4}$ land (25%), the remaining $\frac{3}{4}$ is water (75%)
- Cut the land quarter in half. One part is mountains, desert or covered in ice $\frac{1}{8}$ of the total (12.5%)
- Cut the other land piece into quarters. Each is $\frac{1}{32}$ of the total (3.1%). These areas are too rocky, wet, infertile or covered by buildings and roads
- Peel the skin off the remaining $\frac{1}{32}$ of the apple (3.1%). The skin represents the topsoil, which is suitable for growing food crops for the whole world (less than 1%)

Your child could represent this as a graph or a pie chart.



The Human Clock (ages 7 – 11)

Time can be a difficult subject for children to understand. The human clock game makes this tricky topic active and fun for your child.

- Why not try creating a large clock using sticks, chalk, or anything else that works for you and read out different times, getting your child to make the time using their arms as the clock arms while lying on the ground?
- Can your child show you the time that various things would finish on their human clock? E.g. It takes me 30 minutes to water the garden. If I started watering at 1.35pm, what time would I finish?



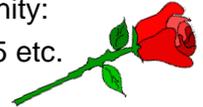
Number patterns in plant families (ages 7-11)

Although it may appear that the arrangement of leaves and flowers is disorganised, or even random, there are patterns everywhere in nature. The most obvious of these follows the **Fibonacci** sequence. This magical sequence was first described by Indian mathematicians hundreds of years ago. It was introduced to the Western world by the Italian mathematician Leonardo of Pisa (more famously known as Fibonacci) in the early 13th Century. There is a linear and spiral pattern. Each number is created by adding together the previous two and continues to infinity:

$0+1 = 1$, $1+1 = 2$, $1+2 = 3$, $2+3 = 5$ etc.

The **Fibonacci** sequence:

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610...



- Can your child find examples of Fibonacci numbers when looking at the number of petals on different flowers?
- Did you know that families of plants have the same number of petals? The rose family has 5 petals. Can you find any other examples in the garden with 5 petals?
- What about 3 petals? 8 petals? etc...

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