

# STEM from Home

## Mathematical Patterns In Nature

Spend some time with nature. Observe, explore and investigate. You will be enthralled by the amazing shapes and patterns you see.

Look closely at the formation of a honeycomb, the intricacies and perfection of a spider's web, the concentric circles in a section of a tree trunk and you will be able to see the magic of math.

Mathematics forms the building blocks of the natural world and can be observed all around us in stunning ways including symmetries, circles, spirals, meanders, waves, foams, tessellations and stripes.

In this STEM pack, you will use HTML and Javascript to code the Fibonacci series, go on an expedition to collect information about patterns in nature and design a Fractal Tetrahedron.

## Main Activity: **Code The Sequence**

### Introduction

The Fibonacci sequence is amazing and so is coding! Let's write a code that generates a Fibonacci sequence.

### What You Will Learn

1. Coding with HTML & Javascript
2. Coding the Fibonacci Series

[Click here for the activity details.](#)

### What You Will Need

#### Hardware

A computer

#### Software

- Notepad or a simple text editor
- A web browser like Microsoft Edge or Google Chrome

#### Important Information

The Fibonacci sequence is one of the most famous number sequences in mathematics.

Named after the famous mathematician, Leonardo Fibonacci, this number sequence is a simple, yet profound pattern.

Each number in the sequence is the sum of the two numbers that precede it. So, the sequence goes: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, and so on.

The Fibonacci sequence is often seen in different structures in nature. A few examples include the number of spirals in a pine cone and pineapple or seeds in a sunflower, or the number of petals on a flower.

The numbers in this sequence also form a unique shape known as a [Fibonacci spiral](#), which again, we see in nature in the form of shells and the shape of hurricanes.

[Click here](#) to know more about Fibonacci Sequence and Nature.

This link explains the phenomenon in detail and also has an interactive segment. Go ahead and explore.

# Bonus Activities

## Activity 1: Explore, Observe, Record!

### Introduction

In this activity, you will go out into a park or a botanical garden and look for special patterns formed in flowers, leaves, branches or barks of trees.

### What You Will Need

- Reference material – [‘Mathematical Patterns’](#)
- Notebook and pen/pencil for recording and analysing results.
- A cloth/canvas/jute/paper bag to collect objects.
- Printout of the Nature Expedition worksheet.

### What you will learn

1. You will be able to recognize mathematical patterns in nature.
2. You will observe and identify different patterns in natural objects in your environment.

### [Let's get started](#)



# Challenge Activity: Fractal Fun!

Probably the most remarkable thing about fractals is that there are fractal patterns all around us! You may think you know nothing at all about fractals yet, but the truth is you actually do. That's because you've grown up in a world full of fractals.

Fractals are fascinating mathematical patterns that are never-ending. They repeat and are similar regardless of scale. In other words, a small part of the whole looks just like the whole. These patterns create beautiful images and if you look closely, they are easy to spot in your surroundings. Trees, snowflakes, ferns and sections of ancient monuments are examples of Fractals.

## Your Challenge:

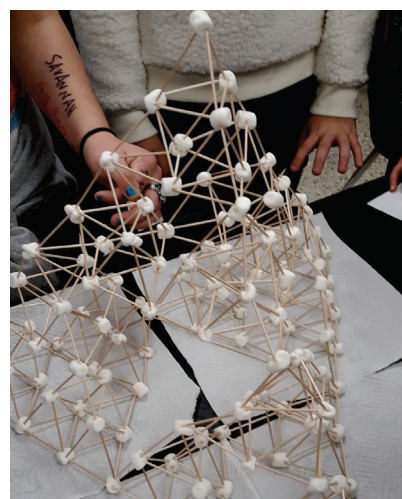
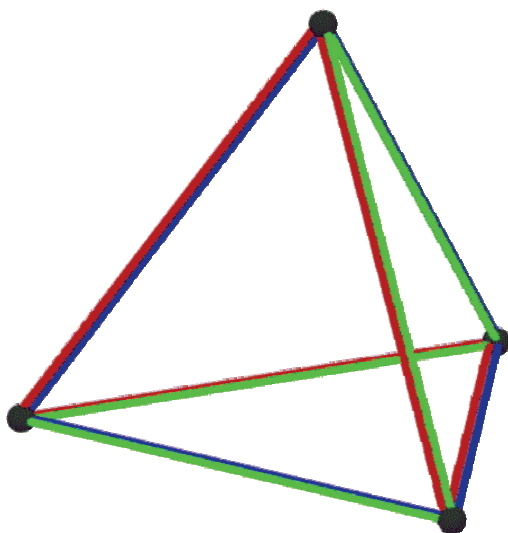
A tetrahedron is a simple three-dimensional shape made of four equilateral triangles. Your Task is to create a giant fractal tetrahedron consisting of multiple tetrahedrons connected to each other.

Remember in fractals, the smallest part of the whole, looks exactly like the whole. So keep the angles and the shape of the structure in close watch. Use the protractor to measure the angles as you build up.

## Materials You Can Use:

1. Toothpicks
2. Play Dough or small thermacol balls (to connect the toothpicks to each other)
3. Protractor (to measure the angles)

Once you complete the challenge, upload a video of your final product. Your project needs to be handmade but your final submission can be presented digitally using [Docs](#) or [Presentation](#) software.



Check this site for exploring, downloading and using software to create fractals online.

<https://fractalfoundation.org/resources/fractal-software/>