

## The Geometry of Leaves

By Ansata M. Baha and Catherine Duffett

Fatima lived in a warm, vibrant town in the Gambia, right near a grand forest of baobab and mango trees. She loved finding patterns and counting geometric shapes in the local marketplace. Where people saw delicious honeycomb full of honey, Fatima saw neatly arranged hexagons. In butterflies, she saw perfect symmetry in their colourful wings. She would be mesmerised by the spirals in seashells.

Thousands of miles away, in a bustling skyscraper-filled city in the USA, lived her friend, Aminatta. She would notice the small things: the spirals in a fern just beginning to unfurl. She would marvel at the beauty of a sunflower – its seeds forming a neat spiral in the centre. In winter, she would draw stunning snowflakes with intricate details that showed the beautiful symmetry that most people would overlook.

Every month, they sent each other letters filled with equations, maths puzzles, and discoveries. One breezy afternoon, Fatima received a large, flat envelope with American stamps. Inside, pressed carefully between two sheets of wax paper, was a bright red maple leaf with five distinct, pointed sections.

“Dear Fatima,” Aminatta's letter read. “Autumn is here, and the leaves are changing colour! Look closely at this maple leaf. If you fold it right down the middle, both sides match perfectly. It has perfect reflectional symmetry! Not only that, but you can see that it has pointed lobes that spread out from the centre. If the angle between the leaf lobes is measured, you will find that they are acute angles!

Fatima smiled, admiring the dark reds and vibrant browns and oranges in the leaf. She took out a protractor to check the angles herself. Excited, she grabbed her notebook and ran outside to her family's neem tree. She plucked a few leaves and began drawing what she saw. These beautiful, bright green leaves must have been about the length of a ruler, but these leaves began to intrigue her. What she thought was one leaf was actually many leaflets, growing in pairs on either side of the central stem. Like the maple tree, the leaflets formed a line of perfect symmetry.

Fatima sat down and wrote back right away, explaining what she observed. She placed the leaf safely inside the envelope alongside a sketch showing the geometric patterns she had mapped out.

When Aminatta received the envelope in the USA, she was thrilled. She glanced at the American maple leaf and the leaf she had received from the Gambia. Two leaves from different sides of the Atlantic Ocean, yet they both followed the exact same rules of mathematics. Mathematics is truly a universal language written in the trees that we walk past every day.

