

## South Indian art ( Kambi Kolam)

### Kambi Kolam a daily mathematical activity

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In Tamilnadu, one would find a finest drawn and artistic drawing decorating every house at the front entrance. These drawings are not just merely a decoration, but it has lot more significance to this practice. During festival seasons and on any auspicious functions, the drawing is drawn still larger even extending up to the street! A classic example can be noted from these, a woman's creative at its best, talent to make it an even more attractive.

A kolam is a geometrical drawing composed of curved loops drawn around a grid pattern of dots. It is sometimes called Rangoli and can be very elaborate and colorful. Kolams originated about 2500 BC in the Indus Valley Civilization and are believed to help bring wealth and prosperity to the home or business. Kolams are thought to bestow prosperity to homes. Every morning in Tamil Nadu, millions of women draw kolams on the ground with white rice powder. Through the day, the drawings get walked on, rained out, or blown around in the wind; new ones are made the next day. Every morning before sunrise, the floor of the owners house, or where ever the Kolam may be, is cleaned with water and the muddy floor swept well to create an even surface. The kolams are generally drawn while the surface is still damp so the design will hold better. Even powdered white stone can be used for creating Kolam. Occasionally, Cow Dung is also used to wax the floors. In some cultures, cow dung is believed to have antiseptic properties and hence provides a literal threshold of protection for the home. It also provides contrast with the white powder.

Decoration is not the sole purpose of a Kolam. In olden days, kolams were drawn in coarse rice flour, so the ants would not have to walk too far or too long for a meal. The rice powder also invited birds and other small creatures to eat it, thus welcoming other beings into one's home and everyday life: a daily tribute to harmonious co-existence. It is a sign of invitation to welcome all into the home, not the least of whom is Lakshmi, the Goddess of prosperity and wealth. The patterns range between geometric and mathematical line drawings around a matrix of dots to free form art work and closed shapes(Wikipedia)

In the art form of kolam, dots called pulli are arranged in **rhombic, square, triangular, or free shapes**, and a single, uninterrupted linear or curvilinear line, called the kambi, intertwines the dots. While there are no written or verbally stated rules, Yanagisawa and Nagata have deduced some of the basic rules of **pulli and kambi kolam from examining the designs:**

- (1) **Loop drawing-lines, and never trace a line through the same route.**
- (2) **The drawing is completed when all points are enclosed by a drawing-line.**
- (3) **Straight lines are drawn along the dual grid inclined at an angle of 45 degrees.**

**(4) Arcs are drawn surrounding the points.**

**(5) Smooth drawing**

**They do point out that some exceptions to these rules are made, although rarely.** We would also like to add, based on our observations, a sixth rule:

**(6) There must be symmetry in the drawings.** Girls somehow understand these implicit regulations and operate within the parameters[Vidhya]

From THE Hindu Newspaper - Connecting the dots of joy, "I selected this pattern some 15 days ago," says Meenakshi, a teacher. "In fact, I practised in rough papers and selected the colours too."

"Without any mathematical instruments, women draw kolams that are always symmetrical. It is not only an art but also an exercise for women," sermonizes Dhanalakshmi

"I have almost half-a-dozen notes with at least 1000 designs. But every year, I make a new note as I often misplace my old notebooks," says Mangayarkarasi.

The women are self-centred and competitive when they are drawing their own kolams, yearning for appreciation and eager to show that their kolam is unique among the lot drawn on the street. But once they've finished they become selfless and help their friends and neighbours in completing their kolams.

Today the art is vanishing because many live in apartments. Many change their style of art to rangoli.

**Advantages of this Art:**

- 1. Improves our math ability**
- 2. Good exercise**
- 3. Stress relieving activity**

**My work:**

I developed a animated project for drawing kolam art

- i. Step Kolam ( interlaced dots, triangular)**
- ii. Extend kolam (parallel dots, free shape, Single loop Kolam / Anthathi kolam- Kolam starts at one point and ends at same point)**

using python language

Input to my project is numbers (Dots for kolam)

I related Mathematics Sequence of numbers and Graph Thoery (Hamiltonian Cycle, Traveling Salesman Problem) with my Kolam project

1. 1,2,3,4,5,6,7.....

My project stepkolam generates pattern for the given input

2. 4,6,8,10,.....

My project extend kolam works for even numbers starting from 4

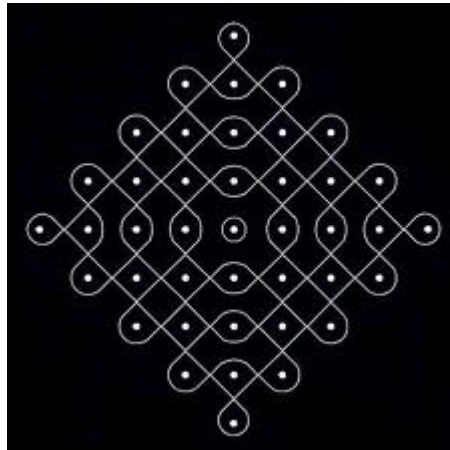
**KOLAM DOTS:**

Dots give a structure to the kolam. Dots can be arranged parallel( Neer pulli in Tamil) or Interlaced( Oodu pulliin Tamil)

- Odd number of dots 1,3,5,7,9.....  
( odd number parallel dots ends with odd number of dots)

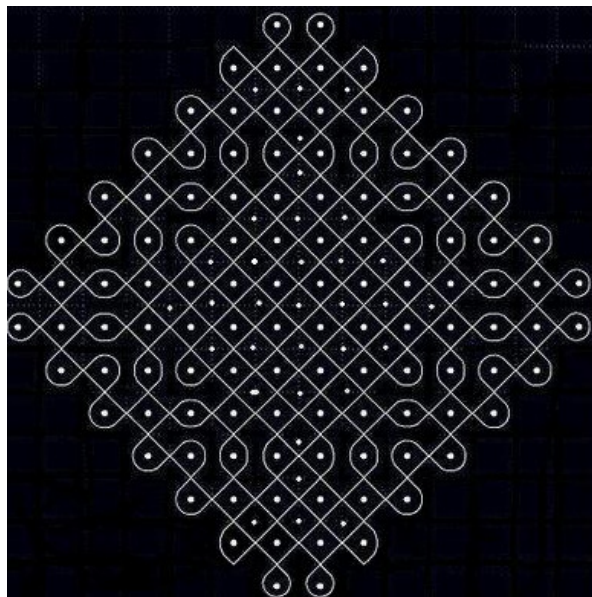
Eg: 1-3-5-3-1 (Parallel dots)

1-2-3-5-3-2-1 (Interlaced dots)



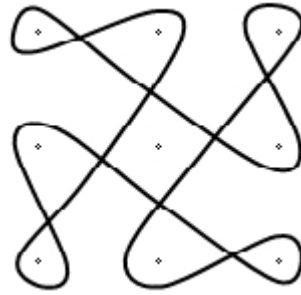
**Fig : 1-3-5-7-9-7-5-3-1 ( Parallel dots)**

- Even number of dots 2,4,6,8,10.....  
( Even number parallel dots ends with Even number of dots)



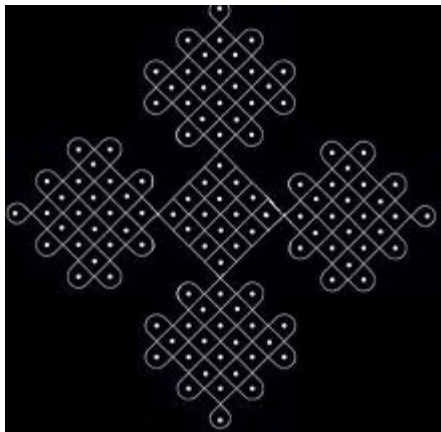
**Fig: 2-4-6-8-10-12-14-12-10-8-6-4-2 (Parallel Dots)**

- Matrix / Square Kolam : 1x1,2x2,3x3,4x4.....



**Fig : Matrix 3x3**

- Rectangle Kolam:1x2,1x3,1x4...2x1,2x3.....
- Triangle Kolam: n dots to 1 dot ( Upper side or Lower side)
- Free shape kolam:



**Fig :Free shape Dots in any order( depends on pattern to be repeated)**

- Kolam images from Kamalas corner

**Conclusion:**

There are certain rules to be followed for drawing Kambi kolam. More number of patterns can be generated for the given dots. Ones creativity and interest help to create a large number of patterns. My work gives you an idea of how to draw kolam and how the same pattern can be extended by increasing the number of dots. In my work, extend kolam is single loop kolam. Even when number of dots are increased, the loop is one, So it is called Anthathi Kolam.. In case of step kolam when the dots are increased, the loop count varies depending on the dots.