KOLAMS !

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November 2018

KOLAMS are curved line patterns.

Making kolams is a popular social and cultural practice in southern India. It is practiced by women and their daughters who make them on the ground outside their homes on a daily basis. Traditionally they are made with rice powder, however other materials are also used today.

The *practice of making* kolams and the *process of learning* how to make them is an *embodied* activity.

Kolams are steeped in *mathematical concepts* - they involve Spatial Reasoning and Patterning, Algebra, and extend to applications in Computer Science.

Kolams make for a rich entry point for exploring math through a lens of critical cultural pedagogy.

Critical Pedagogy Questions

When teaching math through practices that are embedded in another culture, how can we maintain the integrity of the cultural practice as well as the foundational math concepts we wish to explore?

What is the value of trying to understand mathematical ideas through different knowledge systems?

What does it mean for different systems of knowledge to engage in conversation with one another? What might this look and feel like? How do we come to understand our own knowledge systems?

What does it mean when beauty and aesthetics are at the centre of learning and practice? What constitutes beauty? How can we teach about beauty in a manner that is empowering?

Resources

Math link: Bapat, Madhuri. (2008). Mathematics in Rangolee Art from India. *The Bridges Archive.* pp

Math and Cultural links: Thirumurthy, V., & Simic-Muller, K. (2012). Kolam: A Mathematical Treasure of South India. *Childhood Education, 88*(5)
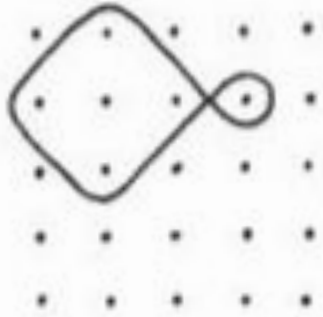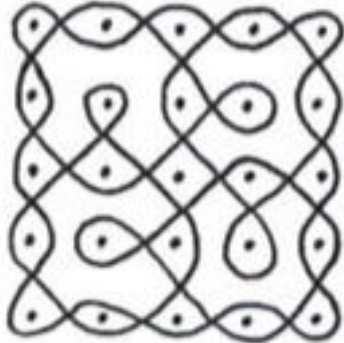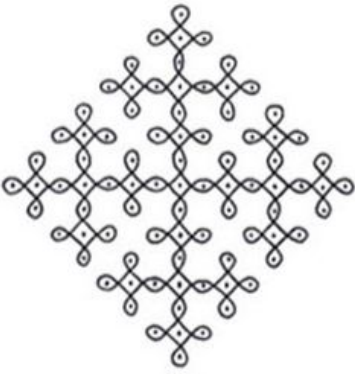
Case Study: Chenulu, S. (2007). Teaching mathematics through the art of kolam. *Mathematics Teaching in the Middle School, 12*(8), 422-428.

Further Connections

...Reflective Symmetries, Rotational Symmetries, Line Symmetries, Point Symmetries, Dihedral Symmetries, Cyclic Symmetries, Transformation, Translation, Recursive Patterns, Fractal Patterns, Tessellation, Growing Patterns, Iterations, Knot Theory, Eulerian Paths, Open Circuits, Closed Circuits, Algebra, Graph Theory, Geometry, Grid Patterns, Rectangular Lattice, Isometric Lattice, Hexagonal Lattice, Curves, Vertex, Region, Arc, Visual Memory, Visual Imagery, Ethnomathematics...

Vernacular Vocabulary: Kolam, Rangoli, Muggu, Pulli, Nelli, Kambi

Entry Points for Teaching Math through Kolams

Kolams	Math Ideas, Strands and Grades	Things to consider and explore
	Number Sense & Numeration Counting • One to one correspondence • Counting forward and backwards in groups *Measurement* Relationships • Investigating area • Investing relationships between perimeter/area	What is the process of making kolams? Culturally, how has this knowledge been passed on? Who participates in it? What meaning is embedded in the practice? Building grids - what skills and thinking are needed to conceptualize and build a grid around which to create a kolam?
	Patterning & Algebra Patterns and Relationships • Types of Patterns • Reflection, rotation, translation and growing patterns Variables, Expressions and Equality • Investigating algebraic equations	Investigating Relationships through Recursive/Repeating, Shrinking/Growing Patterns What is the relationship between the numbers of vertices, regions and arcs in a kolam?
	Geometry and Spatial Sense Geometric properties • Lines of symmetry Geometric relationships • Compose and identify shapes within shapes Location and movement • Grid Systems/ Translation/Reflection	"Krishna's Anklets" - what can this pattern tell us about the cosmology this design is embedded in? Eulerian Circuits - explore the experience of following an Eulerian path in one fluid motion. What are the properties of patterns that create Eulerian circuits? Growing Fractal Patterns