Academic Journal of Sukuna – AJoS, A Peer-reviewed Interdisciplinary Journal
Volume 5 (Issue 1) 2025 July (2082 Ashad), Pp. 38 – 61, ISSN 2594-3138 (Print)
Research Management Cell (RMC – Sukuna), Sundarharaincha, Morang

Use and Transmission of Vedic Geometric knowledge: What, Where and How?

Doi: https://doi.org/10.3126/ajos.v5i1.81801

Dandapani Gautam[1]*, Lekhnath Sharma PhD[2],
Dinesh Raj Panta[3], Jayanta Acharya PhD[4]
[1]Faculty of Sukuna Multiple Campus, Morang, Nepal
[2] Prof. Tribhuvan University, Nepal
[3]Prof. Nepal Sanskrit University
[4] Prof. Nepal Sanskrit University
*Email: dandapani04@gmail.com

Abstract

This article explores the geometric knowledge embedded in Vedic rituals, focusing on the construction of Agnikundas (fire altars) as detailed in the Vedic texts Sulba Sutras, Kundamandip Siddhi and also highlights the central place of geometry in Vedic rituals including the use of right-angled triangles, square roots, and precise measurements to construct ritual spaces. Through field observations and interviews with Sanskrit scholars and ritual practitioners, the research uncovers the informal transmission of this knowledge and its absence from modern Sanskrit curricula. A survey of 100 participants revealed limited awareness of these geometric principles. The knowledge of constructing Agnikundas is transmitted to the generations through participatory approach with the seniors means they learned through hands-on learning, and culturally responsive approach to learning geometry. The study indicates the need of curriculum reform on Sanskrit intuitions to include Vedic geometry used on rituals to bridge traditional knowledge and contemporary education. Integrating this ancient practice could enhance students' understanding of geometry while preserving cultural heritage.

Keywords: Vedic Rituals, Aagnikunda, Geometry, hands -on learning

Introduction

Every people grow up with performing ritual activities in his/ her culture. Culture is a set of shared beliefs, values, customs, and practices that evolve organically within a group of people (Cambridge Dictionary of culture; online,2025). Culture encompasses language, social norms, arts, religion, and other elements that bind individuals together. According to Geertz (1973), culture is "symbolically constructed," meaning that it is expressed and communicated through various forms, such as rituals, art, and social practices. Culture forms the foundation for the development of more formalized expressions of beliefs, such as rituals. Rituals are structured actions that emerge as formalized expressions of culture. They are often symbolic and tied to religious or social practices, functioning as ways to communicate cultural beliefs and values within a community. Bell (1997) explains that rituals, particularly religious ones, help maintain social or cosmic order through symbolic actions. Rituals are deeply connected to cultural practices and serve to enact and formalize cultural norms.

The Vedic culture drew up a program of sixteen rituals for the shaping of men. The usual practice of rituals in Vedic cultures were popularized believing that performing the rituals make the entire life successful. Shori (2006) writes that "rituals assert the activities to upraise the soul, mind and body. Vedic rituals are of three kinds; Nitya (to be performed daily), Naimitya (performed on special occasion) and Kamya (optional/performed with specific intention). There are sixteen rituals in Vedic culture (also called Naimitya or indispensable) to perform in a person's life up to his/her death. Vedic people believe that God will be happy if requested through sacrifices on fire placing on an Agnikundas (specially designed fire place) of different shapes on different rituals. Vedic rituals are sacred practices rooted in the ancient Vedic texts known as the Vedas. For instance, in the Vedic tradition, rituals involve the construction of the Agnikunda (fire altar). These rituals require understanding of geometry, as documented in the Sulba

Sutras, ancient texts that prescribe the geometric principles for constructing fire altars (Kak, 2005).

In Vedic culture, various activities related to mathematics used to call ‘Hisab or Ganita”. The word ‘Hisab’ which typically means ‘calculation’ or ‘account’ as noun, and ‘to calculate’ or ‘to account for’ as verb (kumar, 2005). The word ‘Ganit’ used to mean mathematics in the early Vedic period and later the word ‘Rekha Ganit’ used to mean for geometrical works as like topic of modern geometry (Nepali Ganit Kosha, 2075). The word Sulba Sutra is commonly referring to Mathematics calculations based on Sulba means a rope or string. The word Sulba is derived from the Sanskrit language ‘Sulab’ meaning ‘to measure’: a chord employs in measuring while constructing and in Vedic rituals. (Upadhaya, 2075).

Vedic text Sulba Sutras explained the geometric knowledge and procedure to construct the exact shape of Agnikundas in Vedic rituals. Therefore, it is important to explore, how Vedic geometry was used to construct Agnikunda is such a precise way, following the rigors geometric construction and calculation. Paramhans (2004) explains main three geometrical constructions related to building Agnikundas on ritual performance consist of make a circle on a given straight line, transform the square shape in equal area, and make another circle with double of the area of the original circle. The literatures indicate that Vedic rituals demand knowledge of plane geometry and its transformation. In Nepalese context, we do not find much research related to the use of geometry in ritual performance. Now questions arise; What is the content of geometric knowledge used on Vedic rituals? How geometrical knowledge is transmitted to the practitioners of Vedic rituals? Are the Vedic rituals being performed with the use of geometrical knowledge? Is this geometrical knowledge different from geometry of school mathematics? To explore the answers of questions as such, this study aims to explore the geometrical knowledge used in Vedic rituals, focusing on the construction of Agnikundas. It seeks to understand their purpose, structure, and dimensions; examine

current construction practices; and assess how this knowledge is transmitted across generations and can be integrated into schools' geometry learning. With these overarching objectives, this study focused to explore geometry used in Vedic rituals and geometry teaching learning techniques on performing Vedic ritual with the following methods and materials.

Methods and Materials

Ancient Vedic texts such as the *Sulba Sutras* and Sanskrit texts like *Kundamandip Shiddhi* were taken as the basis for this study. To find the geometry teaching learning techniques used on Vedic rituals, dyadic interview with 50 Sanskrit scholars (Sanskrit teachers, practitioners of Vedic rituals like Guru – purohits having their Sanskrit education from Nepal and India and professors of Sanskrit University) and a total of 100 students from grades nine and ten, studying in various Gurukuls of Jhapa district and involved in performing Vedic rituals, were surveyed using a questionnaire. The Vedic rituals performed on the different occasion in Nepalese context were observed to triangulate the information obtained. So, this research is based on historical cum survey in design, explorative and analytic in nature.

Result and Discussion

Geometrical knowledge used on performing rituals as mentioned on different Vedic texts and its current practices are discussed below.

Use of Geometrical knowledge in Vedic rituals

Vedic rituals demand fire on the central part of Vedi (place for performing ritual) for offering materials. It is mentioned for offering materials on Agnikunda from western direction to the east when Kritika Nakshatra will appear in the east (Satapatha Bhramana II;3ka.4 pra,1bra). Dikshit (1957) writes that Kritika Nakshatra appeared in the east before 3068 BC in the east. This evidence shows that Bhranmana period was before 3068 BC and geometrical knowledge is being used in Vedic rituals from the same

time. For performing Vedic rituals there needs determination of four directions known as cardinal directions. The process of finding cardinal is discussed as below.

Finding Cardinal Directions (East, West, North, South)

To find the cardinal direction Vedic people used to place a pole upright on the ground then describe a circle with its center at the midpoint of the pole. Next, fix pole longer than radius of the circle and observe the shadows cast by the pole as they intersect the circumference of the circle during sunrise and sunset. This process of finding cardinal direction gives the intersection of two straight lines perpendicularly and this is same as today's rectangular axes of coordinate geometry. The cardinal direction helps to place different fires in a Vedi of Vedic rituals.

Vedic ritual demands three specific Agnikundas of same area in different shapes are Ahavaniya Agni in square shape, Garhapatya Agni in circular in shape and Daksina Agni in semi – circular shape. Ahavaniya and Garhapatya Agni are in a straight line (North to south and Daksina Agni is in the east). The only criteria are of equal in area and Daksinagni (Semicircular shaped) placed at a distance of $\sqrt{5}$ units from Ahavaniya (Square shaped) Agni and $\sqrt{2}$ units from Garhapatya (Circular shaped) Agni. The construction of Square and transforming to circle and semicircle demands the activities with the use of geometrical and arithmetical knowledge. Now questions arise: how Vedic people learnt to construct such geometrical shapes maintaining area equal? What is the nature of geometrical knowledge used? If Vedic people used concept of decimal values like $\sqrt{5}$, $\sqrt{2}$ then why such knowledge is not discussed in the school education?

The proof the geometrical knowledge is not demonstrated on the Sanskrit texts but mentioned in the form of verses. Gurjar (1947) writes that the geometrical knowledge used on Vedic rituals is empirical and demonstrative in nature. In addition, Gurjar writes the system created by the Vedic geometry is: Divide the figure and readjust, Construct the figures with general enunciation, Construct the number of square

units in each side, Construct a figure with combinations of areas in different shape. Transformations of areas in square to other shapes like rectangle, circle, semicircle and isosceles trapezium. Hence, we can conclude the system created by geometry used on Vedic ritual is demonstrable.

To construct these Agnikundas, there needs length units. Some of the length (nonstandard units used on Vedic rituals only) measures found on Sanskrit text used for the construction are Angula (Standard Unit) also called Eak Haat (One fifth the length of ritual performer taken from toes to the top of the middle finger while standing by raising both hands). And the derived units are Aratni (21 Angulas), Ratne (22 anguls), Pada (12Angulas), Vyama (96 Angulas), Prakrama (30 Angulas), Purusa 120 anguls, Janu (32 Angulas) (Kundamandap Shiddhi 2999).

This shows that different measurement units are utilized in the construction of Agnikundas for ritual performances, so great care is taken to ensure precise shape and size of the Kundas. Now question comes how are the units used to construct Agnikundas? The use of different units to construct Agnikundas of rectilinear and circular roots are as follows.

For the number of sacrifices (Hawans) below 100, a square of side length 21anguls, For 100 – 999 sacrifices (Hawans), square of side length 22 anguls, for 1000 – 9999 sacrifices square of side length 24 anguls, for 10000 – 99999 sacrifices 34 anguls (Dui Haat), for 100000 – 999999 hawans square of side length 41 Angul (Char Haat) and for 1,00,00,000 and above Hawans square of side length Aath Hat is requires (Kundamandap Shiddhi, P. 53, 2999).Now question comes if 24 anguls is Ek hat Why 34 anguls is Dui Haat and not of 48 angul? The following table illustrates the answer of such question.

Table 1

The Details of Measurement for Agnikundas with rectilinear root (Square)

Hasta		1	2	3	4	5	6	7	8	9	10
Kshetra	Barguangul	576	1152	1728	2304	2880	3456	4032	4608	5184	5760
Kshetra	Angul	24	34	41	48	53	58	63	66	72	75

Source: Kundamandap Shiddi, P. 60

The table shows that square with side length is 24 anguls has area 576 sq. Angul and its two times is 1152 Sq. Angul and its square root is 33.941125, so they take the round figure 34 anguls called (Dui Hat) to construct the Agnikundas of 1152 sq. Anguls and similarly. This shows that ancient Vedic people have knowledge of square, square root, concept of decimal and rounding to near counting number. Now question comes what is the purpose of construction of Agnikunda in Vedic rituals? what are the roots (shape on the top face of Agnikunda) and dimensions (measurements and proportions) of Agnikundas use on Vedic rituals?

The purpose of constructions of Agnikundas in different Vedic rituals is listed on the following table.

Table 2

Purpose to construct different Aagnikundas on Vedic rituals (Yagya karya)

S.N.	Shape of Kunda (Fire Alter)	Purpose
1	Chaturastra Kunda (Rectilinear root)	For Karya siddhi
2	Yoni Kunda (Vagina root)	Request for the birth of Son (Putra lav)
3	Ardha Chandra Kunda	Desiring for peace (Kalyan)

4	Trikod Kunda (Triangular root)	Request to destroy enemies (Satru nas)
5	Wartul Kunda	For peace (Shanti Prapti)
6	Sadasrta Kunda	On death or Uchhed karma
7	Padhma Kunda	Requesting for rain
8	Astrasta Kunda	For desiring prosperity (Arogya kolagi)

Source: Kundamandap Shiddi, P. 55 - 56

Now it is discussed the construction of different types of Agnikunda from mathematical perspectives. When constructing Agnikundas, great care is taken from two perspectives (Dimensions and shapes) called as Ved. Dimensional (Aayam Ved) perspective of focuses on the measurements and proportions, ensuring they are constructed according to the specifications laid out in the Vedic texts. Shape (Aakriti Ved) involves the design of the top face of the Agnikundas, which can vary based on the ritual's needs and the specific wishes to be fulfilled. Both the dimensions and the shape of the Agnikunda are tailored to accommodate the number of sacrifices and the objective of the rituals. The following discussion is made on dimensions and shapes of Agnikunda.

Types of Agnikunda Based on Dimensions

According to dimensions, Agnikundas are categorized into five types: Chaturastra Kunda (Square Kunda), Trikona Kunda (Triangular Kunda), Ardhachandra Kunda (Half-Moon Kunda), Vrittakunda (Circular Kunda) and Uttara Kunda (Rectangular Kunda). This shows that dimensions of Agnikundas are in geometrical shapes same as the shapes discussed on the school geometry. Aagnikundas are viewed from the three different perspectives according to their shapes. They ae as follows:

Vertual Kunda (circular shaped)

Aagnikundas of circular shaped on the top face on the ground are four in types. They are Vrita kunda (circular shaped), Aarda Chandra Khnda (Semicircular shaped), Padhma Kunda (shape in the form of lotus flower), Surya Kunda (shaped in the form of Sun).

Konatmak Kunda (angular kunda)

Konatmak Kunda refers to Agnikundas with distinct corners. The term "Kon" signifies the number of corners, with various altars constructed according to this characteristic. The design and shape of these Kundas are integral to the rituals they support. There are eleven different Agnikundas classified based on the number of corners.

The classification of Agnikundas based on the number of corners highlights the meticulous approach of Vedic practitioners in designing fire altars. Each type of Kunda serves a specific purpose and aligns with the intentions of the rituals performed. They are Trilon Kunda (Triangular kunda), Chaturastra Kunda (Kunda made by four sides), Panchastra Kunda (Kunda made by five sides), Sadastra kunda (Kunda made by six sides), Saptastra kunda (Kunda made by seven sides),Aastrastra kunda (kunda made by eight sides), Nawastra kunda (kunda made by nine sides), Rudra Kunda also called Ekadas kunds (Kunda made by eleven sides),Sadtrisastra kunda (kunda made by thirty-six sides),Asta Chatwaristra kunda (kunda made by forty-eight sides).

This discussion shows that Agnikundas are constructed in different mathematical shapes with different units of length measurement. Now question arises like; What are the parts of Agnikundas? Do the parts of Agnikundas utilize the mathematical properties? The following discussion is made on the parts of Anikundas.

Parts of Aagni Kunda

Each agnikunda has five parts: Khat, Kantha, Yoni, Mekhala and Navi. Khat (depth /garahiyai) of agnikuda under the ground level. The length of Khath below the

ground level is $\frac{5}{8}$ part of total length and $\frac{3}{8}$ above the ground called Mekhalas (Source: Kundamandap Siddhi, 2017). For example, if an Aagnikunda is of 24 anglul then the length of khat is 5 out of 8 parts means of 15 anglus and 9 anguls above the ground called Makhelas. The height above the ground is also divided into three layers. The third layer of the Mekhala is located just above the ground, forming the bottom of the three layers. This layer has a height of 1/12 of the side length of the Agni Kunda, the second layer is with height is $\frac{1}{8}$ part of the side length of the Agnikundas and the topmost layer positioned just above the second Mekhala, making it the highest layer of height $\frac{1}{6}$ of the side length of Agnikundas.

Yoni, Kantha and Navi

A Yoni-shaped is constructed at the center of one side of the first layer of the Mekhala. This shape is created by placing a leaf of Pipal tree onto the soft clay positioned in the middle of that side of the first Mekhala. Kantha is the bottom face of the Agnikunda, this is same in face and size as its top face. Navi is the location where the fire is placed at the center of the Kanth. To initiate the ritual performance, the fire must be created or placed on the Navi. In other words, sacrificial fires are established on the Kanth of the Agni Kunda, and offering the materials (Hawans) are made on this fire placed on the Navi.

The Sanskrit texts Kundamandap Siddhi, Sanskar Prakash outlines the principles for constructing Agnikundas. To begin Vedic ritual, a square-shaped area of desired dimensions of agnikunda is outlined on the ground. This square-based area then is transformed into other desired shapes for the construction of agnikundas as per the wishes of the practitioners of performing the rituals. The fire alters constructed with the help of square are as follows.

Chaturastra (Rectilinear root) Kunda

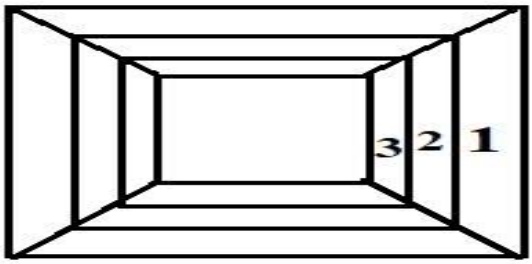
The Chaturastra Kunda is characterized by its four sides. Generally, a square is constructed on the ground of measure 24 angul (or one hand), khat and three layers of mekhelas are constructed on it as illustrated in the accompanying figures.

Figure 1

Geometric Structure of the Caturastra Kunda

Figure 2

Geometric Structure of Caturastra Kunda with three layers of Mekhala



The objective of construction of chaturastra is to complete work “Karya Siddhi”, and the requirements are; Area: 576 sq. Angul, Side length: 24 anguls, height of first mekhla of 4 angul or one sixth part of total length, Second Mekhala: of height 3 Angul or of one eighth of total length, Third mekhela of height 2 angul or of height twelfth part of the total length. To construct the material required are rope of length: 24 + 24+ 24+

24 = 96 angul, Four bamboo poles or nails, bamboo pegs of length 3,2 and 1 anguls, two ropes or bamboo pegs of length $24\sqrt{2}$.

Construction Procedure

A rope of 96 angul is divided into four equal parts, with nails placed at each division to form the shape of a square. Two poles of length $24\sqrt{2}$ anguls are placed at opposite poles of the square to secure the construction. A pit is dug to a depth of 15 anguls, with three Mekhala (raised parts) constructed above the ground at heights of 2, 3, and 4 anguls, respectively. This four-sided figure, referred to as Chaturastra, is square-shaped, with an area of 576 square anguls.

Trikod Kunda

The objective of construction of the Trikod Kunda is to destroy enemy (Shatru Nas). The requirements of Trikod Kunda are; Area: 576 sq. Angul, Side length: 24 Anguls, height of first mekhla of 4 angul, Second Mekhala of height 3 Angul and third mekhela of height 2 angul.

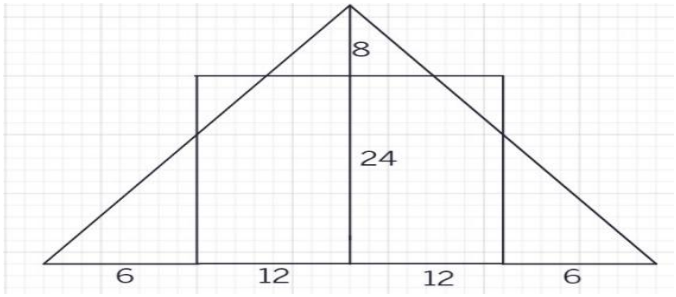
Construction procedure

Start by measuring a square that is 24 angul on each side. Drive nails into the ground at the corners of the square to secure the shape, add length of measure 6 angul outward from both the left and right sides of the base of the square. Total length this increases the total base length from 24 angul to 34 angul. Identify the midpoint of the square and draw a vertical line dividing the square into two equal halves. Extend this vertical line downward by an additional 8 angul, resulting in a total length of 32 angul. Draw straight lines from the extended endpoints of the vertical line to the outer corners of the base (the new endpoints created by the 6 angul extensions). This connection creates a triangular shape equal to the square. The height is the total vertical length of 32 anguis. This triangular area equals the area of the original square (24 angul × 24

angul = 576 square angul), indicating that both shapes are proportional despite their different configurations.

Figure 3

Geometric Structure of Trikod Kunda equal in area of Caturastra Kunda



Brita Kunda

The Objective of constructing Brita Kunda is attainment of Peace (Shanti Prapti) and the requirements to construct Brita kunda are; Area: 576 sq. Angul, Side length: 24 Anguls, two ropes or bamboo pegs of length $24\sqrt{2}$, height of first mekhla of 4 angul or one sixth part of total length, Second Mekhala: of height 3 Angul or of one eighth of total length, third mekhla of height 2 angul or of height twelfth part of the total length, markers (chalk or stones for marking points).

Procedure

First construct a square for this measure a rope of 96 anguls and mark four equal points to create a square with each side measuring 24 anguls. Drive four bamboo pegs into the ground at each corner to secure the shape (label the corners A, B, C, D). Placing the two bamboo pegs of length $24\sqrt{2}$ on the opposite corners level the shape of square on the ground. This square has area of 676 sq. anguls.

Figure 4

Geometric Structure of Wartul Kunda and Its Three Mekhalas

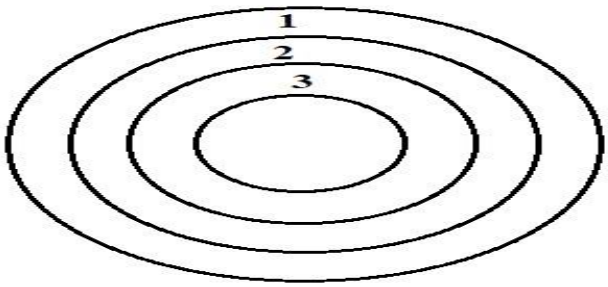
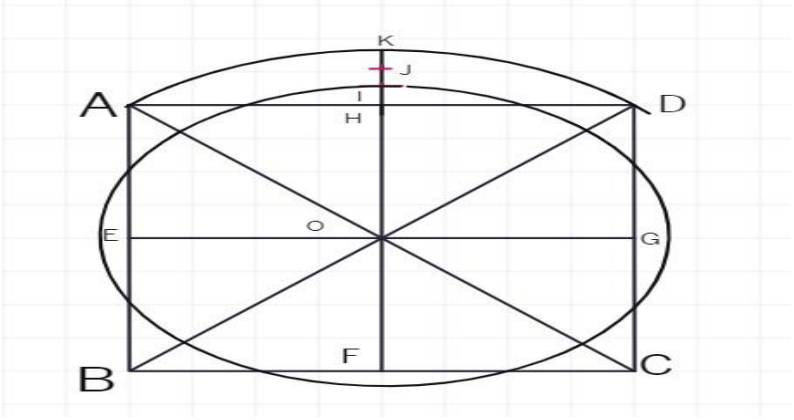


Figure 5

Geometric Structure of Wartul Kunda Derived from Caturastra Kunda



Draw a circle with center (O) at the intersection of diagonals and radius (OA) equals to half of the diagonal of the square. Produce the line joining the midpoints of opposite sides of square (FH) up to the circle at a point K and divide the external length of the line drawn (HK) into three parts at the points say I and J. Lastly, construct a circle of radius from center to the first point of division (OI). This is the required circular shape on of the Agnikunda and construct khat and mekhala on the circular face.

Ardha Chandra (Semi Circular) Kunda

The objective of constructing Ardhachandra kunda is Kalyan Prapti. A square of area 576 sq. Angul with Side length: $24\sqrt{2}$ anguls is required. This construction is made with two ropes or bamboo pegs of length 48, height of first mekhla of 4 angul (one sixth part of total length), Second Mekhala of height 3 Angul (of one eighth of total length), and the third mekhla of height 2 angul (of height twelfth part of the total length), markers (chalk or stones for marking points).

Yoni Kunda

Yoni kunda is constructed for the purpose of Putra Lav (Request for the Birth of a Son). The requirements to construct Yonu kundas are, area: 576 sq. angul, Side length: 24 Anguls, height of first mekhla of 4 angul or one sixth part of total length, Second Mekhala: of height 3 Angul or of one eighth of total length, Third mekhla of height 2 angul or of height twelfth part of the total length.

Material Required

Rope of length: 24 + 24+ 24+ 24 = 96 Angul, four bamboo poles or nails, bamboo pegs of length 3,2 and 1 anguls, two ropes or bamboo pegs of length $24\sqrt{2}$, A shovel for digging, chalk or stones for marking points.

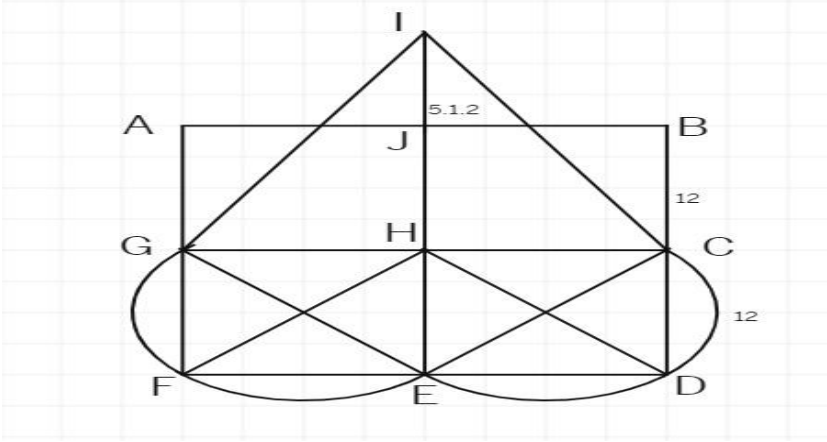
Procedure

Constructing a square of area 576 sq.anguls: A rope of 96 angul is divided into four equal parts, with nails placed at each division to form the shape of a square. Two poles of length $24\sqrt{2}$ anguls are placed at opposite poles of the square to secure the construction. A pit is dug to a depth of 15 anguls, with three Mekhala (raised parts) constructed above the ground at heights of 2, 3, and 4 anguls, respectively. This four-sided figure, referred to as Chaturastra, is square-shaped, with an area of 576 square anguls. Identify the middle horizontal line between the opposite sides so that the square is divided into four equal parts. Draw the diagonals of two squares on lower parts of the

initial square. Draw semi circles on outside of both squares taking center at the point of intersection of two diagonals as shown in the figure.

Figure 6

Geometric Structure of Kunda Derived from Caturastra Kund



Forming the Triangle

Produce the middle horizontal line JE 5.1.2 anguls outside. Connect the endpoints of the extended middle line (E and I) to the endpoints of the other middle line of the square Gand C. This will form a triangle (IGC) that sits above the square. Now the triangle with four semicircles is in the form of Yoni shape as desired. Here the use of 5.1.2 angul shows that the Vedic people have concept of fractions.

Sama Sasadstra Kunda

Sama (equal in side length) Sasadastra kunda (Kunda with six sides) and the objective of constructing Sama Sadastra Kunda is for requesting Death (Uchhed).

Requirements

Area: 576 sq. Angul, Rope of length $12\sqrt{2}$, 7 bamboo poles, height of first mekhla of 4 angul or one sixth part of total length, Second Mekhala: of height 3 Angul or of one eighth of total length, third mekhla of height 2 angul or of height twelfth part of the total length, markers (chalk or stones for marking points).

Figure 7

Geometric Structure Sasadstra Kunda *Derived from Wartul Kunda*

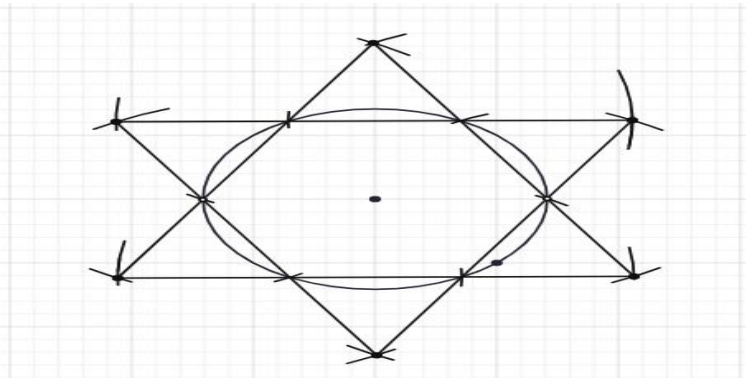
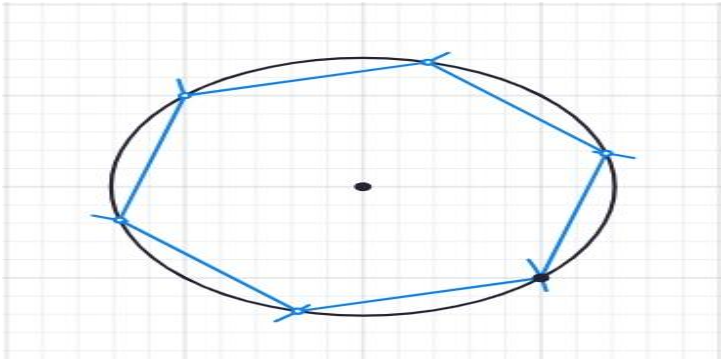


Figure 8

Outline of Sama Sasadstra Kunda on the top face



Procedure

Fix a pole at a point and draw a circle of radius $12\sqrt{2}$ anguls taking centre at the pole. Take a rope equal to the circumferences of the circle and divide the rope into six equal parts. Join the consecutive points marked and obtain the hexagonal shape. This is the required shape of agnikunda. Now construct Khat and Mekhalas on the Hexagonal shape becomes Sama Sasadstra Kunda.

Sama Aastrastra Kunda

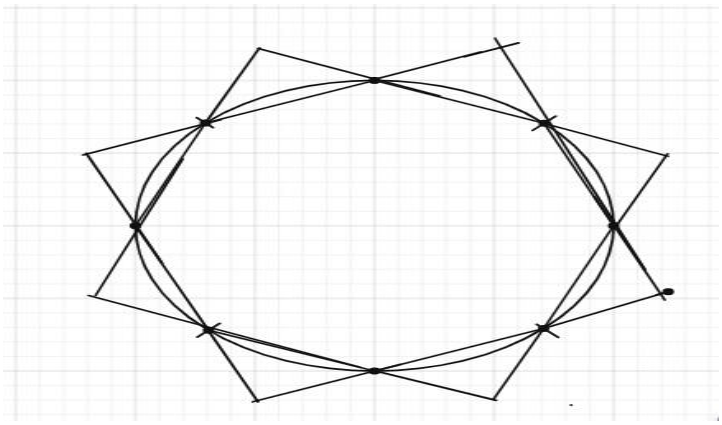
Sama Aastrastra Kunda means Agnikunda with eight equal sides and the objective of constructing Sama Aastrastra Kunda is for desiring prosperity (Arogya ko lagi)

Requirements

Area: 576 sq. Angul, Rope of length $12\sqrt{2}$, 7 bamboo poles, height of irst mekhla of 4 angul or one sixth part of total length, Second Mekhala: of height 3 Angul or of one eighth of total length, third mekhla of height 2 angul or of height twelfth part of the total length, markers (chalk or stones for marking points).

Figure 8

Geometric Structure of Sama Aastrastra Kunda



Procedure

Fix a pole at a point and draw a circle of radius $12\sqrt{2}$ anguls taking centre at the pole. Take a rope equal to the circumferences of the circle and divide the rope into eight equal parts. Join the consecutive points marked and obtain the octagonal shapes desired. Now completing by constructing khat and Mekhalas gives required shape of Sama Aastrastra Kunda

Padhma kunda

Padhma Kunda, designed in the form of a lotus flower and constructed for the purpose of requesting rain. The Padhma Kunda is a sacred structure modeled after a lotus flower, symbolizing purity and beauty. It is constructed with the intention of requesting rain, essential for agricultural prosperity.

This discussion explores the geometrical knowledge used on Vedic ritual highlights the importance of geometric understanding in both traditional and modern contexts. Now question comes, how the ritual activities concerning mathematics are being taught in Sanskrit institutions in Nepal? Do students in Gurukuls recognize the interrelationship between the geometrical knowledge required for constructing Agnikundas? Is there an awareness of how traditional practices can enhance their understanding of geometry in a contemporary educational framework? To find the answer of such question the following discussion is made.

Current Practices of Agnikunda Construction in the Nepalese Vedic Ritual

Nowadays, we can observe the rituals being performed not only in designated areas but also in rooms, on the roofs, and balconies of home. In contemporary practice, priests may create the Agnikunda using circular utensils like a Tagari or by placing two or three bricks. To assess the contemporary practices on the construction of Agnikundas, visits were made in different Sanskrit institutions of Nepal. They are Gurukuls Devghat Chewtan, Sanskrit schools and Pindeshwor Vidhyapeeth in Dharan Sunsari, and different Gurukuls located in Morang and Jhapa district. Through dyadic interviews with the Gurus at each institution, several key observations emerged.

It was found that the construction methods for Agnikundas are not included in the school level Sanskrit curriculum. Instead, students learn the construction techniques informally from their seniors through hands-on practice and observation during ritual activities. The curriculum of Veda on grade eleven of Sanskrit education mentioned the construction of Agnikundas but the curriculum is in general form and not in specific,

because which Agnikundas are to be construct and construction manuals is not specified. This absence further highlights the limited inclusion in Veda Curriculum of comprehensive training regarding the practical aspects of constructing these sacred Agnikundas. Discussions with educators at the Sanskrit university revealed that there was previously construction manuals for Agnikundas included in the Uttarmadhyama course. However, this course has since been omitted at the University level, Changes in University Curriculum resulted a significant gap in the formal teaching of Agnikunda construction practices.

This discussion shows that there is a rich tradition surrounding the construction of Agnikundas, current educational practices lack formalized training and resources in this area. This gap points to a need for revitalizing the curriculum to include comprehensive manuals and instructional materials that would preserve and transmit this vital aspect of Vedic ritual practice to future generations.

Summary

Regarding the construction of Agnikundas, a questionnaire was administered to a total of 100 students from grades nine and ten, studying in various Gurukuls of Jhapa district and involved in performing Vedic rituals. The responses collected from the respondents is described and analyzed in the following section.

Out of the total participants, 90 percent did not provide a response regarding the reason to offer materials into the Agnikunda during the performance of Vedic rituals. Only 10 percent of the students responded, and their understanding was that the Agnikunda is constructed to contain and protect from fire during the rituals.

In the context of performing Vedic rituals, 95 percent of the participants indicated that the Agnikunda is generally pre-constructed by the Yajamana (ritual performer) at the center of the designated ritual space. A small portion, comprising 5 percent, reported that they advise the Yajamana to use a bamboo peg of one hand length as a measuring unit to construct a four-sided Agnikunda. According to the Sulba Sutra,

the term *Chaturastra* (four-sided) denotes a square or a rectangle; however, in practical application, the geometric accuracy associated with the concept of a square or rectangle is often neglected.

While performing Vedic rituals, 100% respondent reported that the Agnikunda is constructed by the Yajamana (ritual performer) themselves without external instruction. Furthermore, all respondents indicated that they do not consider the prescribed measurements of the upper and lower parts of the Agnikunda during construction, as such measurements are not known to them. This suggests a lack of awareness or transmission of the geometrical guidelines outlined in traditional Vedic texts regarding the proper construction of ritual altars.

While performing Vedic rituals, 100% participants responded that the construction of four-sided Agnikundas is commonly practiced. However, none of the respondents reported having knowledge of or paying attention to the specific length, breadth, or area of the Agnikunda as mentioned in the Vedic texts. This indicates a general lack of awareness and consideration for the exact geometrical dimensions prescribed in traditional sources, suggesting that the construction is based more on convention than on scriptural guidelines.

About the instruments used to construct Agnikundas, all participants respond that traditional tools such as a bamboo peg, *khanti* (a large iron nail used for digging), *kodalo* (spade), rope, and *tagari* (a circular-shaped utensil used to carry sand, soil) are used. This indicates that the use of simple, locally available tools—particularly the bamboo peg and rope—has practical value and could be effectively incorporated into present-day school geometry teaching to promote empirical and hands-on learning experiences.

The responses of 100% respondents was they did not learn about the types of Agnikundas during their education in Gurukuls or Sanskrit institutions. Regarding their formal education, the respondents were from Gurukul students of grades 9 to 10. Their

responses indicated that they had not studied any Vedic texts or textbooks that contain the procedures or manuals for constructing Agnikundas. This suggests a significant gap in the curriculum, where knowledge related to the construction of Agnikundas is either absent or not adequately introduced to students at the school level.

Regarding the meaning of '*Angul'* measure, only 5 percent of the participants responded, interpreting it as the width of the middle finger of their hand, while the remaining participants did not provide any answer. In terms of the necessity of constructing an Agnikunda for ritual performance, all participants agreed that the presence of an Agnikunda is essential for offering sacrificial materials. Additionally, when Vedic rituals are performed in limited spaces such as inside a room, on a rooftop, or in a balcony (particularly in urban areas),100% respondent responses were, use of '*Tagari'* as a substitute for the Agnikunda. This practice reflects an adaptation to spatial constraints while still maintaining the essential element of sacrificial offering.

Conclusion

The use of the geometrical knowledge uses to construct Agnikundas on Vedic rituals is based on the shapes like square, circle, semicircle, triangle, Hexagon and Octagon maintaining the area equal to each other. For the construction of Agnikunda, first they used to construct a square and transformed the square into the desire shape for constructing Agnikunda. Khat and Mekhalas are the two parts of Agnikundas, total length of Khat and Mekhala is equal to the side of square. The responses of the practitioners show that Agnikundas are not constructed as mentioned in the Sanskrit texts, so the mathematical properties of construction are not cared on practices. In addition, the responses show that teaching learning activities on construction of Agnikunda are not mentioned in the curriculum of Sanskrit education intuitions but Agnikunda is constructed with the knowledge transmitted through the participatory activities with seniors in the Vedic rituals. It indicates that geometrical knowledge is transmitted through hands-on learning, and culturally responsive approach to learning

geometry. The geometrical knowledge used on Vedic rituals is based on the use of right-angled triangle, symmetry and Proportions Approximation of Square Roots**,** are also the common topic of school geometry. Both Vedic ritual geometry and School geometry focus on understanding shapes, their properties, and the relationships between them. The Vedic ritual geometry provides an early example of how geometry was used for practical and spiritual purposes, which parallels to modern geometry for practical problem-solving in various fields today. Incorporating the ancient Vedic geometrical knowledge into school curricula could enrich students' understanding of the historical and cultural significance of mathematics.

References

Bell, C. (1997). *Ritual: Perspectives and dimensions*. Oxford University Press.

Datta, B. (1932). *The science of sulba sutra: The lecture notes*. Calcutta University.

Dikxit, S. B. (1957). *Bharatiya Jyotish* (S. Jharkhandi, Trans.). Prakashan Burero.

Geertz, C. (1973). *The interpretation of cultures: Selected essays*. Basic Books.

Godbole, R. (2022, January 15). *Squaring a circle and shulbha sutra-square and circle with equal areas?* [Video]. YouTube. Retrieved Jun 12, 2025, from https://www.youtube.com/watch?v=jgN5poka94I&t=261s

Gurjar, L. V. (1947). *Ancient Indian mathematics and Veda*. Continental Book Service.

https://dictionary.cambridge.org/dictionary/english/culture

Katyaayan, A. (2017). *Kundamandap Siddhi*. Chaukhamba Surabharati Prakashan.

Kātyāyana (1974). *Kātyāyana Śulbasūtra* (S.D.Khadilkar,Ed.). Vidika Samsodhan Mandala.

Kumar, A. (2005). *Comprehensive Hindi-English dictionary*. Bharat Publishers.

Kunkarmi, R. (2000). *Chaar Sulba Sutra* (1st ed.). Mahashi Sandipani Rastriya Veda Bidhaya Pratisthan Bharatpuri.

Sayancharya, S. T., & Swami, H. (n.d.). *Satapatha Brahmana*. Nag Prakashan.

Shabrack, K. (2004). *Thinking through rituals: Philosophical perspectives*. Routledge.

Sharma, V. K., & Upadhaya, M. P. (Eds.). (2075). *Nepali Ganita Kosha*. Shabdartha Prakashan.

Shori, M. (2006). *The sixteen rituals of Aryans*. Vaanprastha Sadak Ashram.

Srinivasiengar, C. N. (1967). *The history of ancient Indian mathematics*. World Press.

Kak, S. (2005). *The architecture of ancient India: Space and time in Vedic ritual*. *Studies in History*, 21(1), 1-20. https://doi.org/10.1177/025764300502100101

Tilak, B. G. (1925). *Vedic chronology and Vedanga Jyotisha*. Messrs Tilak Bros.

Tridevi, B. S. (1985). *Samskar Prakash*. Lal Bahadur Shastri Kendra Sanskrit Vidyapeeth.