

ANCIENT MATHEMATICS OF INDIA

Mukesh Kumar

Department of Mathematics
Shyam Lal College, University of Delhi.
Email: mkumarmath@shyamlal.du.ac.in

Indian mathematics gives a unique insight into the history of mathematics within a historical global context. The history of ancient civilisation is often surrounded by the mystery and controversy. Even now, Western scholars have not given enough credit to the work of some of the ancient Indian mathematicians. The aim of this paper is to present short outlines ancient developments in mathematics of India. I mean to summarise the results and contribution of Indian mathematics which were made in the period of Indus valley civilisation (Harappa civilisation) and in Vedic period.

Introduction

It is without doubt that mathematics of India today owes a huge debt to the outstanding contribution made by Indian mathematician over many thousands of years. Quite surprising is that there has been a hesitation to recognise this and one has to conclude that many famous historians of mathematics found what they expected to find.

We shall see the contributions in mathematics of Indian Mathematicians. Also, we shall look briefly at the Indian development in Indus valley civilisation (Harappan civilisation) and vedic period. Also we shall discuss that geometry expounded in the vedic period (Sulvasutra) have often been considered to mark the beginning of mathematics in the Indian subcontinents.

Indus Valley Civilisation

The Indus Valley civilisation (Harappa Civilisation) dated back to 2500–1900 BC.

In the knowledge of Indian mathematics, the Indus Valley civilisation is the oldest civilisation.

Some of the pictographic inscription found in the mining showed that the people of this civilisation had knowledge of numbers, measurement and geometry. Also, it indicates that the first use of mathematics in the Indian subcontinent was found in Indus Valley.

Here we have the facts of the geometric sophistication of this civilisation. The patterns on the pottery excavated at these site shows that the craftsman was well versed in the use of divide for scratching on the surfaces and had well knowledge of concepts of circles.

One of the highlights is that the people of this civilisation had good knowledge of three-dimensional figures because they were good in brick building technology. Also, the well-laid out street of the Indus cities have long been taken as evidence that the Indus people had working knowledge of geometry as shown in the figure.

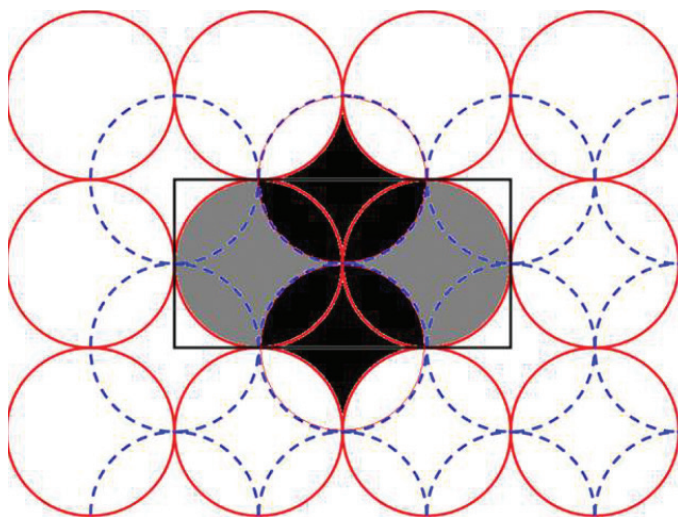


Fig. Close-packing of circles in a four-fold symmetric arrangement having two layers. The two layers are displaced with respect to each other by half spacing in both the direction (horizontal and vertical) and the marked out rectangle shows the area which is transformed into the shape indicate by shaded area.

Vedic Mathematics — The *Sulba-Sutra*

WHAT IS VEDIC MATHEMATICS?

The term 'Vedic mathematics' has come to carry in recent times another implication than what is involved here. It is associated with the book by the same name, published in 1965, authored by Shri Bharati Krishna Tirthaji. The book describes shortcut procedures for some kinds of algebraic or arithmetical computations, which have been associated in sanskrit, serving as aide-memoire for the individual procedures. The book refers to 16 of these phrases as '*sutras*', and another assortment of similar phrases as '*sub-sutras*'. These phrases have no basis in the Vedic literature, and are external to the Vedas in respect to including language and mathematical content. The mathematics

described in the book is essentially a twentieth century formulation, that is why the author calls it 'Vedic mathematics'. It may be noted that it should not be mixed up with the mathematics from the Vedic period which is one of the themes of the present article.

Around 2000 BC, the Harapan culture invaded and destroyed by the Aryans tribes came from Indian subcontinent.

They found Vedic religion; from their works we gain the first literary facts of Indian culture and mathematics. The word Vedic comes from sacred texts known as Vedas. Mathematics first came in Vedic works and the word '*ganita*' first appears in Vedas. The meaning of the term *ganita* is the science of calculations.

Now a days a term 'Vedic mathematics' is becoming popular. Mathematics of this period

consist of geometric techniques needed for fire places described by the Brahmanas. *Sulba-Sutra* of Baudhayana and Katyayana are the oldest known mathematics texts which was part of the Sutra period of the later Vedic age. *Sulba-sutra* mentioned many simple geometrical facts and results, such as construction of isosceles and right-angle triangles, properties of rectangle. The approximate value of $\sqrt{2}$ which were in the Baudhayana found in *sulba-sutra*.

The approximations of $\sqrt{2}$ is

$$\sqrt{2} \gg 1 + \frac{1}{3} + \frac{1}{3 \cdot 4} - \frac{1}{3 \cdot 4 \cdot 34} + \dots$$

which is correct upto five decimal places. Later in the 15th century A.D, a man by name Rama who lived in a place called near

lucknow, improved this approximation as

$$\sqrt{2} \gg 1 + \frac{1}{3} + \frac{1}{3 \cdot 4} - \frac{1}{3 \cdot 4 \cdot 34} - \frac{1}{3 \cdot 4 \cdot 34 \cdot 33} + \dots + \frac{1}{3 \cdot 4 \cdot 34 \cdot 4}$$

which is correct upto seven decimal places.

Conclusion

To summarise, in this we have studied the origin of mathematics and geometry particularly in the Indian subcontinent. I aimed at presenting some of the facts for how India contributed in mathematics. I hope that my account can prove useful.

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