GOVERNMENT DEGREE COLLEGE, PEDDAPALLI

DEPARTMENT OF MATHEMATICS

STUDENTS' STUDY PROJECT

ON

A Study on Ancient Indian Mathematicians

SYNOPSIS

Indian mathematics emerged in the Indian subcontinent from 1200 BCE until the end of the 18th century. In the classical period of Indian mathematics, important contributions were made by scholars like Baudhayana, Acharya Pingala, Manava, Katyayana, Aryabhata, Brahmagupta, Bhaskara-II, and Varahamihira.

The decimal number system in use today was first recorded in Indian mathematics. Indian mathematicians made early contributions to the study of the concept of zero as a number, negative numbers, arithmetic, and algebra. In addition, trigonometry was further advanced in India, and, in particular, the modern definitions of sine and cosine were developed there. These mathematical concepts were transmitted to the Middle East, China, and Europe and led to further developments that now form the foundations of many areas of mathematics.

The ***Sulba Sutras*** (c. 700–400 BCE) list rules for the construction of sacrificial fire altars. Most mathematical problems considered in the ***Sulba Sutras*** spring from "a single theological requirement," that of constructing fire altars which have different shapes but occupy the same area.

Baudhayana, (800 BCE) was an Indian mathematician, who was most likely also a priest. He is noted as the author of the earliest **Sulba Sutra**

Works of Baudhayana

Baudhayana is credited with significant contributions towards the advancements in mathematics. The most prominent among them are as follows:

1. Circling a square: Baudhayana was able to construct a circle almost equal in area to a square and vice versa.

---

2. Value of π

Baudhayana is considered among one of the first to discover the value of 'pi'. There is a mention of this in his **Sulbha sutras**. According to his premise, the approximate value of pi is 3.3.

3. The method of finding the square root of 2.

Baudhayana gives the length of the diagonal of a square in terms of its sides, which is equivalent to a formula for the square root of 2. The measure is to be increased by a third and by a fourth decreased by the 34th. That is it's diagonal approximately. That is 1.4142161, which is correct to five decimals.

Baudhayana theorem

Baudhayana listed Pythagoras theorem in his book called **Baudhayana Sulbasutra**.

दीर्घचतुरश्रस्याक्ष्णया रज्जु: पार्श्वमानी तिर्यग् मानी च यत् पृथग् भूते कुरूतस्तदुभयं करोति ॥

Acharya Pingala

Acharya Pingala discovered the immense possibilities of Binary numbers quite by accident. He was working on the ***Chandah*** of Vedas. Our Vedas were composed in ***Chandah***. Most Indian Languages have the ***dheerga*** or long ***swar*** and the ***laghu*** or short ***swar***. This combination of long and short sounds is the basis of Sanskrit ***chandah***. In 33rd BCE, a work called ***Chandahsastra*** was authored by Pingala, the Mathematician**.**

The **Pingala's** Binary system is a mirror image of the present Binary system.

Pingala Series

While exploring the number of possibilities of various combinations of the laghu and the guru, Pingala hit upon a series:

0,1,1,2,5,8,13,21,34,55……

This was later called Fibonacci series.

Pingala is also credited with the binomial theorem for the index 2, i.e. for $(a+b)^2$.

Katyayana

Katyayana is said to have been a child with great talent and extraordinary memory.

Katyayana in the Indian mythology is recognized for his two works. His work, 'Varttika' is an explanation on Panini's grammar. Varttika is one of the important books on vyakarana.

Katyayana composed one of the Sulba Sutras. Sulba Sutras is a series of nine texts on the geometry of altar constructions.

Submitted by

K.Ramya, A.Ramya, P.Laxman, U.Srikanth, B.Santhosh