A STUDY OF MATHEMATICAL INFLUENCE FROM INDIA

Priyanka Bhardwaj
Research Scholar
OPJS University
Rajasthan
priyankabhardwaj106@gmail.com

Dr. Uma Shankar Yadav
Assistant Professor
OPJS University
Rajasthan

Abstract: *With the assault of Islamic invasions and the transformation of colleges and universities into madrasahs, the study of mathematics seems to be on the decline. Moreover, around this time, more and more mathematical literature was being translated into Arabic and Persian. The advent of the Harappan decimal system, mathematics in the Vedic period, Panini and scientific notation, the Indian numeral system, the significance of astronomy, applied mathematics, and philosophy and mathematics are all covered in this essay.*

Keyword : *Numbers*, History of Mathematics.

The Decimal system in HARAPPA :

According to an examination of Harappa weights and measures, a decimal system was already in use during that time. The scales A scale with decimal divisions that corresponds to the ratios of 0.05, 0.1, 0.2, 0.5, 1,2, 5,10, 20, 50, 100, 200, and 500 has been found. The astounding precision of Harappan weights and measures is a particularly noteworthy feature. A bronze rod with markings in units of 0.367 inches illustrates the level of accuracy required at the time. The rise of trade and commerce in Harappan civilisation is shown by the presence of a graduated system of accurately marked weights.

MATHEMATICAL ACTIVITY IN VEDIC PERIOD :

The Narad Vishnu Purana, according to Ved Vyas, lists the arithmetic operations (Ganit) such as addition, subtraction, multiplication, fractions, squares, cubes, and roots (pre 1000 BC). The Sulva-Sutras of Baudhayana (800 BC) and A pasthmaba (600 BC), which provide Methods for the building of ceremonial alters in use throughout the Vedic era, are two examples of geometric Knowledge (rekhaganit). Current addition and multiplication techniques most likely developed from the approach mentioned in the Sulva-Sutras.

The Greek mathematician and philosopher Pythagoras was acquainted with the Upanishads and learned the fundamentals of geometry from the Sulva-Sutras. Pythagoras flourished in the sixth century B.C.

PANINI AND SCIENTIFIC NOTATION :

In his work known as Astha dhyayi, Panini (c. 6th BC) gave formal production rules and definitions explaining Sanskrit grammar in addition to outlining a complete and scientific explanation of phonetics, phonology, and morphology. Classes were established for fundamental components like vowels and consonants as well as parts of speech like nouns and verbs. Similar to formal language theory, ordered principles acting on underlying structures were used to develop the formation of compound words and sentences.

Today's definitions of mathematical function may also be compared to Panini's creations.

THE NUMERAL SYSTEM :

The Indian notational system, which was brought to the Western world by the Arabs and is now universally recognized, was the only formal notational system that the Chinese had that had the abstraction and elegance of the Indian notational system. This development was influenced by a number of factors, the importance of which is best explained by French mathematician Laplace.

The awkward roman number system presented a significant challenge in the West, while the pictorial script presented a challenge in China. However, almost all of the necessary conditions existed in India for such a development. The usage of decimal numerals has a lengthy and well-established history.

A Buddhist school of thought may have been stimulated by Panini's studies on linguistic theory.

IMPORTANCE OF ASTRONOMY AND APPLIED MATHEMATICS :

A connection between commerce and mathematical study can be seen in Brahma Gupta's description of positive numbers as fortunes and negative numbers as debts. Astronomy knowledge was crucial for trading communities that traveled at night across oceans and deserts. The language of choice for scientific communication was Sanskrit.

The study of astronomy was also influenced by the need for precise calendars and a better comprehension of weather and rainfall patterns for crop selection and timely sowing. Astronomy and religion both contributed to the development of an interest in astronomy at the same time. Aryabhatta, one of the greatest scientists of the Gupta era, provided a systematic analysis of the positions of the planets in space in 476 AD. He correctly postulated the earth's axial rotation and deduced that planets' orbits were ellipses.

Aryabhatta's understanding of the solar system during the Revolution was greatly influenced by mathematics. His estimates of the size of the solar year and the circumference of the earth were remarkably accurate. Arya Bhatta had to work out a number of mathematical issues for this. Trigonometry and bra problem solving problems were not previously addressed. Varahamira of Ujjain (6th C), another significant astronomer, compiled previously written texts on astronomy and significantly improved Aryabhatta's strigono metric formulas.

Arya Bhatta had to introduce the idea of the Moon's infinitesimal, nearly instantaneous motion and express it in the form of a fundamental differential equation in order to develop a precise mapping of the lunar eclipse. That were further developed by Bhaskaracharya (12th C) and Manjula (10th C), who arrived at the differential of the sine function. Later, when determining the areas of curved surfaces and the volumes they enclosed, mathematicians used their intuitive understanding of integration.

There were advancements in practical mathematics as well, such as the development of trigonometric tables and measuring units. In his work Ganit-Saar Sangraha from the ninth century, Mahavir acharya of Mysore outlined the present approach for determining the Least Common Multiple (LCM) of given integers. Also, he developed formulas to determine the areas of an ellipse and a quadrilateral encircled by a circle. Sridhara of Bengal offered mathematical solutions for a range of real-world issues including ratios, barter, simple interest, mixes, buy and sale, rates of travel, and salaries in the latter part of the ninth century. Bhaskara charya, who headed the astronomical observatory at Ujjain and hailed from a long family of mathematicians, was the dominant figure in 12th-century Indian mathematics. He left behind a number of important mathematical books.

PHILOSOPHY AND MATHEMATICS :

Mathematical notions and formulations were greatly influenced by philosophical beliefs as well. Jain cosmology held that a pace and time were unbounded, much to the Upanishadic worldview. This sparked a passionate interest in definitions of infinite numbers as well as extremely huge numbers. Jain set theory and the Syadvada framework of Jain epistemology are probably complementary. philosophical statements about zero. Emptiness or vacuum, in other words, may have made it easier to introduce the idea of zero. Although the zero (bindu) as an empty place holder in the place value numeral system may be found far earlier, an algebraic definition of the zero and its connection to mathematical functions can be found in the mathematical treatises of Brahma Gupta from the seventh century AD.

References

[1]B. Datta: The science of Sulba (Calcutta, 1932).

[2]A. K. Bag : Mathematics in Ancient and Medieval India (1979, Varanasi). [3]T. A. Saraswati : Geometry in Ancient and Medieval India (1979, Delhi).

[4]G. Kumari : Some significant results of algebra of pre – Aryabhattaera, Math.Ed. (Siwan) 14 (1) (1980).