Naveen Shodh Sansar (An International Refereed / Peer Review Multidisciplinary Research Journal)
RNI No.- MPHIN/2013/60638, ISSN 2320-8767, E- ISSN 2394-3793, Scientific Journal Impact Factor (SJIF)- 8.054,
October to December 2024, E-Journal, Vol. I, Issue XLVIII, ISO 9001:2015 - E2024049304 (QMS)

Aryabhatta : Great Indian Mathematician and Astronomer

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Abstract : Aryabhatta, also known as the father of Indian Mathematics, was a ronowned Astronomer and Mathematician of the ancient times of India. His most famous works are the Aryathatiya (499 CE, when he was 23 years old). He was also the first Mathematician to obtain the calculation based on sine and versine tables from 0 to 180 degrees with four decimal places of precision. He was the first person to say that Earth is spherical and it revolves around the Sun.
Keywords – Aryabhatta, Ancient Astronomy, Solar system, Mathematics.

Introduction - Aryabhatta was an ancient Indian Mathematician and Astronomer who lives during the Gupta dynasty, approximately between 476 and 550 CE. He is widely regarded as on of the most influential figures in the history of Indian Mathematics and Astronomy. Aryabhatta's contributions laid the foundation for significant advancements in these fields.

Aryabhatta was born in 476 CE in Ashmata, possibly present day Kodungallur in Kerala, India. Not much is known about his personal life, and historical records about the personal life of Aryabhatta are sparse and limited. While the absence of personal details leaves much unknown about Aryabhatta's daily life, his enduring legacy lies in the impact of his groundbreaking ideas and theories in the fields of Mathematics and Astronomy.

Aryabhatta's most renowned work is the 'Aryabhattiya' a comprehensive text that covers various aspects of Mathematics and Astronomy. It is composed in 118 verses, each written in poetic form. These verses cover various aspects of Mathematics including arithmetic algebra, and trigonometry, as well as astronomy, providing insights into Aryabhatta's profound understanding of these subjects.

Methodology – The research for this study involves a through analysis of ancient Indian Texts, Scholarly articles on Aryabhatta and his work, In addition, data from online journals and websites is also utilized together information for this study.

Contribution of Aryabhatta to Astronomy – Aryabhatta made several impactful discoveries and inventions in Astronomy. Aryabhatta's astronomical system was known as the audAyaka system. Scientists made several discoveries such as that Planets and Moon in the Solar system are lightened by sunlight only. He gave the theory that Earth rotates on its axis only. Some of the Aryabhatta's significant contribution to Astronomy includes:

1. **Solar system motion**
2. **Sidereal periods**
3. **Eclipses**
4. **Heliocentrism**

Aryabhatta also wrote several books about his discovery and piece of work in Mathematics and Astronomy. Some of books are Aryabhatiya, Rishab's Good Theory of Indian, Dash Geetika, Arya sidhanta.

Contribution of Aryabhatta to Mathematics – Aryabhatta made several contributions to Mathematics inventions and theories. Due to his significant contribution and achievement in Mathematics.

A few of the Aryabhatta's contributions to Mathematics includes following:

1. **Decimal places :** Aryabhatta invented the decimal system and used zero as a place holder. He names the first 10 decimal places and gives algorithms for abtaining square and cubic roots, using the decimal.
2. **Value of Pi :** He treats geometric measurements employing 62832/20000 =3.1416 forπ, very close to the actual value of 3.14159.
3. **Area of Triangle :** Aryabhatta correctly calculated the areas of a triangle and of a circle for example, in Ganitapadam, he mentioned that " for a triangle, the result of a perpendicular with the half-side is the area".
4. **Table of sines :** Using the Pythagoras theorem he obtained one of the two methods for constructing his table of sines.
5. **Other contributions :** Mathematical series, Quadratic equation, Indeterminate equations, Trigonometry, Algebra.
6. **Understood the concept of Zero :** Aryabhatta in his work Aryabhatiya, developed a number system using letters from the Indian alphabet to represent numbers. Aryabhatta's

understanding of the place value system in numbers required the concept of zero. The place - value system was clearly in place in Aryabhatta's work. Aryabhatta did not explicitly use a symbol for zero in his work. However, French Mathematician Georges Ifrah argues that Knowledge of zero was implicit in Aryabhatta's place - value system.

Conclusion – Aryabhatta's contribution to Mathematics and Astrology were phenomenal and influential. The discoveries and inventions made by the Aryabhatta turned out to be helpful in the Science and Mathematics fields. Aryabhatta's contributions to Mathematics like trigonometry, pi, place value system etc. solve significant problems and are still practiced and taught in school and colleges. His contribution to Astronomy brought major changes in the scientific sector, which led scientists and Astronauts to achieve new milestones in Astronomy.

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