CONTRIBUTION OF ANCIENT INDIAN MATHEMATICIANS

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Abstract:- The history of any ancient civilization is often surrounded by mystery and controversy. Still, Western scholars have not given sufficient credit to the work of some ancient Indian mathematicians, notably Brahmagupta, Bodhayana and Bhaskara II, despite the fact that their entire works were translated into English by the nineteenth-century British Sanskrit scholar Henry Thomas Colebrooke. In the initial part was done by The purpose of this article is to lay out the facts and leave the reader free to interpret and evaluate them according to his own understanding of the subject. Sincere efforts have been made to bring the contribution of some ancient Indian mathematicians to the public.

Keywords:- Right angled triangle, Decimal system, Alphanumeric system, Shulva Sutra.

Introduction:- Mathematics is the backbone of science and technology. Sage Lagadha has written in Vedang Jyotish that :-

यथा शिखा मयूराणाम् नागाणाम् मणयो यथा !

तद्वद् वेदांग शास्त्राणाम् गणितम् मूर्धनिस्थितम् !!

Meaning - Mathematics is adorned on the top of all Vedanga scriptures in the same way as the crest on the head of a peacock and a gem on the hood of a snake.

India's contribution to the world:- Looking at the history of mathematics, we see that India's contribution in mathematics is very special and world famous. It is the concept of the whole world that most of the mathematical knowledge originated in India only. Perhaps this is the reason that Albert Einstein, the great scientist of the century, has commented that we are indebted to the Indians who taught us to count, without which any scientific discovery is impossible. The great French mathematician Pierre Laplace has written: - India has given us the best system of expressing every number by ten digits. Pro. Ginsberg says: - Around 770 AD, a Hindu scholar Kank from Ujjain was invited by Abbasid Caliph Almansur in the famous court of Baghdad. In this way the Hindu number system reached Arabia. The discovery of the French scholar MF Nau proves that Hindu numerals were well known and appreciated in Syria in the mid-seventh century. Pro. B.B.Dal says:- From Arabia to Egypt and North Arabia, numerals gradually reached Europe and reached Europe completely in the eleventh century. The Europeans called them Arabic numerals because they got them from the Arabs, but the Arabs themselves unanimously called them Hindu numerals and these numerals are called Hindsa by the Arabs.

The credit for the concept of zero is given to the great Sanskrit grammarians Panini (500 BC) and Pingala (200 BC). Zero was invented by the Vedic sage Gritsamad, this type of mention is also found.

The first evidence of fixing a symbol for zero is found in the Bakshali Manuscript (300-400 AD). The contribution of zero and its symbol is most important in the numerical system of ancient India. Till now no authentic fact has been found as to who invented zero, but the whole world is of the opinion that zero was invented in India only.

Aryabhatta (born 476 AD) had given birth to a new alphabet system. He has worked in the same method in his book Aryabhatiya. In Ganitapada 2 of his book Aryabhatiya (498 AD), it is written by telling the numbers from one to a billion: - स्थानात स्थान दशगुन स्यात means each next number is ten times the previous number. His saying this proves that definitely the invention of zero is older than Aryabhatta.

In the Gupta period, Brahmagupta, in his treatise Bahnmasphuta Siddhanta, explained zero as a-atra 0 (zero). Sridharacharya writes in his book Trishavika that if a number is added to zero, then there is no change in that number and if a number is multiplied by zero, then the product is also zero. In Sanskrit documents available 2500 years old, details of the rich

tradition of discoveries made in the field of mathematics by Indians are found. In the early Vedic period (1200-600 BC), the decimal system of numbers, the rules of arithmetic and linear arithmetic had been developed. These were written in a complex system of mantras, hymns, praises, curses, verses, hymns and other religious rituals.

Mathematics developed more in India during the later Vedic period (1000 to 500 BC). In this period Upanishads were written and many types of philosophy based on Vedas were created. In the Vedic period, due to the practice of making accurate measurements of different types of altars and different shapes on them, the formulas of geometry were developed in this period, which are available in the form of Shulva Sutras.

In a right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the remaining two sides. This relation between the sides of a right triangle is known as the Pythagorean theorem. But it is mentioned on page (243) of Dr. Brajmohan's book History of Mathematics that most of the history has started to believe that the authors of the Pythagorean theorem Shulva Sutras were recognized from the birth of Pythagoras in 501 BC. While the Indian mathematician Baudhayana (800 BC) expressed this theorem in its most comprehensive form, many years before Pythagoras. He has written in Baudhayana Shulva Sutra:-

दीर्घ चतुरस्त्रस्य अक्षण्या रज्जुः पार्ष्वमानी तिर्यक मानी च।

यत पृथग्भूते कुरूतः तत् उभयं करोति (इति क्षेत्र ज्ञानम)॥

It means:- The area of the square on the diagonal of a rectangle is equal to the sum of the areas of the squares on the two sides of the rectangle.

It should also be known that the credit for the discovery of gravity is given to Newton. Newton is believed to have discovered gravity in 1666. But about 500 years before Newton, Bhaskaracharya had composed a complete treatise on the Earth's gravitational force. Bhaskaracharya was a famous mathematician and astronomer of ancient India. He was born in 1114 AD. Bhaskaracharya was the head of the observatory located in Ujjain. This observatory was the leading center of mathematics and astronomy in ancient India. He was just 36 years old when he wrote the book Siddhanta Shiromani. Siddhanta Shiromani is a huge book. In which the formulas of mathematics and astronomy have been explained in a very simple and poetic way. Regarding gravity, he has said in his book:-

मरूच्लो भूरचला स्वभावतो यतो,

विचित्रावत वस्तु शक्त्यः॥

आकृष्टि शक्तिष्च महीतय यत् खस्थं,

गुरूस्वामिमुखं स्वषक्तत्या।

आकृष्यते तत्पततीव भाति,

समेसमन्तात् क्व पतत्वियं खे॥

Meaning- The earth has the power of attraction. The earth pulls heavy objects towards itself with its gravitational force and due to this attraction it falls on the ground. But when there is equal force in the sky from all sides, then how can anyone fall? That means the planets in the sky remain independent. The gravitational forces of various planets maintain the balance.

Conclusion:- People's thinking has changed with time and along with here, the people of the world are also getting interested in knowing and understanding Indian culture. Perhaps the result of this is that people's attention was drawn towards the great creations of ancient sages and mathematicians. The biggest example of this is the theorem of Pythagoras, which is now known as Bodhayan-Pythagoras theorem. The aim of Indians from the beginning has been Vasudhaiva-Kutumbak. Everything discovered by them was devoted to public welfare. We kept forgetting our great tradition and kept getting lost in the depths of ignorance. Today, there is a need for re-research on the beliefs established by our sages so that their discovery can be employed in the direction of public welfare.

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