Indian Mathematicians and Their Contributions

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ABSTRACT

Indian mathematics has its roots in Vedic literature. Between 1000 B.C. and 1800 A.D. various treatises on mathematics were authored by Indian mathematicians in which were set forth for the first time, the concept of zero, numeral system, techniques of algebra and algorithm, square root and cube root. However, despite widely available, reliable information, there is a distinct and inequitable neglect off the contributions of the sub-continent. Many of the developments of Indian mathematics remain almost completely ignored, or worse, attributed to scholars of other nationalities, often European. However a few historians (mainly European) are reluctant to acknowledge the contributions of Indian mathematicians. They believe Indians borrowed the knowledge of mathematics from Greeks. In this article author has written the significant Indian mathematicians brief history and their contributions.

1. RAMANUJAN:

- He was born on 22^{na} of December 1887 in a small village of Tanjore district, Madras. He failed in English in Intermediate, so his formal studies were stopped but his self-study of mathematics continued.
- He sent a set of 120 theorems to Professor Hardy of Cambridge. As a result he invited Ramanujan to England.
- Ramanujan showed that any big number can be written as sum of not more than four prime numbers.
- He showed that how to divide the number into two or more squares or cubes.
- when Mr Litlewood came to see Ramanujan in taxi number 1729, Ramanujan said that 1729 is the smallest number which can be written in the form of sum of cubes of two numbers in two ways, i.e. $1729 = 9^3 + 10^3 = 1^3 + 12^3$ since then the number 1729 is called Ramanujan's number.
- In the third century B.C, Archimedes noted that the ratio of circumference of a circle to its diameter is constant. The ratio is now called 'pi (Π)' (the 16th letter in the Greek alphabet series)
- The largest numbers the Greeks and the Romans used were 106 whereas Hindus used numbers as big as 10^{53} with specific names as early as 5000 B.C. during the Vedic period.

2. ARYABHATA
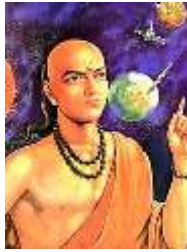
- Aryabhatta was born in 476A.D in Kusumpur, India.
- He was the first person to say that Earth is spherical and it revolves around the sun.
- He gave the formula $(a + b)^2 = a^2 + b^2 + 2ab$

- He taught the method of solving the following problems:

$$1+2+3+4+5+\ldots\ldots\ldots+n = \frac{n(n+1)}{2}$$

$$1^2+2^2+3^2+4^2+5^2+\ldots\ldots\ldots+n^2 = \frac{n(n+1)(2n+1)}{6}$$

$$1^3+2^3+3^3+4^3+5^3+\ldots\ldots\ldots+n^3 = \left(\frac{n(n+1)}{2}\right)^2$$

$$1^4+2^4+3^4+4^4+5^4+\ldots\ldots\ldots+n^4 = n(n+1)(2n+1)(3n^2+3n-1)/30$$

3. BRAHMAGUPTA

- Brahma Gupta was born in 598A.D in Pakistan.
- He gave four methods of multiplication.

- He gave the following formula, used in G.P series

$a + ar + ar^2 + ar^3 +\ldots\ldots\ldots + ar^{n-1} = (ar^{n-1}) \div (r - 1)$

- He gave the following formulae :

Area of a cyclic quadrilateral with side a, b, c, d= √(s -a)(s- b)(s -c)(s- d) where 2s = a + b + c + d Length of its

diagonals =
$$\sqrt{\left(\frac{bc+ad}{ab+cd}\right)(ac+bd)} \cdot \sqrt{\left(\frac{ab+cd}{bc+ad}\right)(ac+bd)}$$

4. SHAKUNTALA DEVI

- She was born in 1939
- In 1980, she gave the product of two, thirteen digit numbers within 28 seconds, many countries have invited her to demonstrate her extraordinary talent.
- In Dallas she competed with a computer to see who give the cube root of 188138517 faster, she won. At university of USA she was asked to give the 23rd root of 9167486769200391580986609275853801624831066801443086224071265164279346570408670965932792057674808067900227830163549248523803357453169351119035965775473400756818688305 620821016129132845564895780158806771.

She answered in 50seconds. The answer is 546372891. It took a UNIVAC 1108 computer, full one minute (10 seconds more) to confirm that she was right after it was fed with 13000 instructions.

- Now she is known to be Human Computer.

5. BHASKARACHARYA
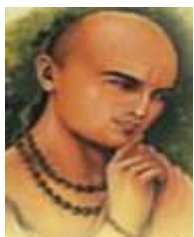
- He was born in a village of Mysore district.
- He was the first to give that any number divided by 0 gives infinity (00).
- He has written a lot about zero, surds, permutation and combination.
- He wrote, "The hundredth part of the circumference of a circle seems to be straight. Our earth is a big sphere and that's why it appears to be flat."
- He gave the formulae like $\sin(A \pm B) = \sin A.\cos B \pm \cos A.\sin B$

6.   C. P. Ramanujam

C. P. Ramanujam was one of the great mathematicians born in Chennai in year 1938. During his doctoral examination at Tata Institute of Fundamental Research in 1957, Ramanujam impressed all his teachers and fellow students with his mathematical problem solving capability. He has contributed a lot toward the mathematical field especially in field of algebra and geometry. In 1973, Ramanujam was elected as a Fellow of the Indian Academy of Sciences.

7.   D. R. Kaprekar

D. R. Kapreka was yet another great mathematician who was born in Mumbai in year 1905. Kapreka pursued his graduation from University of Mumbai and started working as a teacher. Kapreka contributed lot towards various topics including recurring decimals, magic squares, and integers with special properties. The credit for the discovery of Kaprekar constant and Kaprekarnumber goes to him.

8.   Narendra Karmarkar

In year 1957, Narendra Karmarkar was born in Gwalior. He has completed his graduation in electrical engineering from IIT Bombay and went to USA for post graduation and PhD. Karmarkar was famous for his contribution in inventing polynomial algorithm for linear programming. In year 2000, he received Paris Kanellakis Award for his work in the field of mathematics.

9.   Harish Chandra1
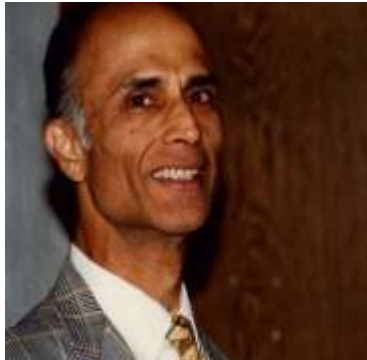
Harish Chandra was a famous American physicist and mathematician from Indian origin. He pursued his masters under the supervision of Homi Bhabha. He has worked on several mathematical theories with renowned mathematicians from all across the world. In 1954 he received Cole Prize of the American Mathematical Society.

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