

Magical Mathematics of Ramanujan

A. K. Mallik

Indian Institute of Engineering Science and Technology, Shibpur

Abstract

Ramanujan's mathematics had a mystical quality. Very often, his results seem to pop out from nowhere. In this popular level talk, we mention some such works. We start with a 4 x 4 magic square starting with his date of birth, which has many interesting properties beyond a normal magic square. It will be shown how he makes an intuitive leap to get a new result starting from a simple Pythagorean relationship. His famous Taxicab number and its relation with a special case of famous Fermat's Last Theorem (Conjecture) will be mentioned. Ramanujan provided a series giving rise to the fastest algorithm for evaluating the decimal digits of π . Besides a curious function created by him, we also discuss a problem, involving infinite radicals, posed by Ramanujan in 1911. Then we show how he solved instantaneously all the roots of a so-called Brahmagupta's equation arising out of a puzzle posed to him by Prof. P. C. Mahalanobis in 1914. A short discussion on highly composite numbers and his celebrated result on partitioning of a number, the product of a happy collaboration with his mentor Prof. G. H. Hardy, is included. Finally we present Ramanujan's primes and a couple of other magical formulas.

About the speaker:

Dr. Asok Kumar Mallik is currently an Honorary Distinguished Professor at Indian Institute of Engineering Science and Technology, Shibpur. He was a Professor of Mechanical Engineering at the Indian Institute of Technology Kanpur from 1982 to 2009. He was the first occupant of S. Sampath Institute Chair (Professorship) established in 2006. He has been elected as an Institute Fellow at IIT Kanpur. He was a commonwealth scholar at The Institute of Sound and Vibration Research - Southampton, England and an Alexander von Humboldt Fellow at TH Aachen and TU Darmstadt, Germany. He is a recipient of the Distinguished Teacher Award of IIT Kanpur, Indian National Science Academy Teacher Award and Distinguished Alumnus Award of BESUS (Former Bengal Engineering College, Shibpur). He is an elected fellow of Indian National Academy of Engineering (FNAE), National Academy of Sciences, Allahabad, (FNASc), Indian Academy of Sciences, Bangalore (FASc) and The Indian National Science Academy, New Delhi (FNA). He is an Honorary Fellow of The Association of Mechanisms and Machines for his lifetime contribution in the field of Theory of Mechanisms and Machines. He has authored/coauthored 9 books and 85 research papers in International Journals. Areas of his research and consultancy include Vibration Engineering, Nonlinear Dynamics and Kinematics. He also writes articles and books on Mathematics and Physics at popular level.