INSTITUTE FOR THE ADVANCEMENT OF VEDIC MATHEMATICS

5th International Vedic Mathematics Conference

Sree Sankara College

Kalady, Kerala

11th - 13th August 2022

INSTITUTE FOR THE ADVANCEMENT OF VEDIC MATHEMATICS

in collaboration with

Sree Sankara College and Cosmic Maths

Dept of Mathematics, Dept of Statistics, Dept of Sanskrit presents

5th International Vedic Mathematics Conference

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Kalady, Kerala

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IN COLLABORATION WITH

SUPPORTED BY

EDUCATION RENAISSANCE TRUST

Indian Council for Cultural Relations (ICCR)

Welcome Message from Managing Director

I am extremely proud that the Department of Mathematics, Sree Sankara College in association with IAVM is organizing the 5th International Vedic Mathematics Conference from August 11 to 13.

Vedic Mathematics, India's next contribution to the digital world, is becoming increasingly popular as more and more people are introduced to the beautifully unified and easy Vedic methods. I sincerely hope that this International seminar will contribute in a large way in fostering a greater understanding of Indian Mathematical culture and also in providing a platform for practitioners of Vedic Mathematics to share their research and experience.

Sri K.Anand
Managing Director
Sree Sankara College

Principal's Welcome Message

Greetings from Sree Sankara College, Kalady!

Pranams at the Lotus feet of Sree Sree Bharathitheertha Mahaswamigal and Sree Sree Vidhushekhara Bharathi Swamikal!

I am elated that Sree Sankara College, Kalady, in association with IAVM is hosting a three day International Conference on Vedic Mathematics. This conference will have eminent speakers on the panel who would dwell in particular on the rich history of mathematics in India and its modern applications.

On behalf of the Organizing Committee, I welcome all the Vedic Mathematics professionals to this signature event of the year, the fifth International Conference on Vedic Mathematics to be held from August 11 to 13, 2022 at Sree Sankara College, Kalady.

The programme has already shaped up to be excellent and I am eagerly anticipating an enlightening meeting with brilliant mathematicians from different countries around the globe sharing new insights and exciting results in Vedic Mathematics.

We, at Sree Sankara College, sincerely hope that you accept our invitation and join the elite conference.

Looking forward to meeting you.

Dr Preethi Nair
Principal
Sree Sankara College

Welcome Message from IAVM

The organisers would like to extend a very warm welcome to all delegates at this 5th International Vedic Mathematics Conference. With some of the world's foremost authorities on Vedic Maths, together with enthusiasts, educationalists, teachers, parents and children, this conference promises to be a truly fascinating and inspiring event. We hope you will enjoy the presentations, activities and discussions on offer and that you find them valuable and rewarding.

There is an ongoing groundswell of interest in, and development of, Vedic Mathematics based on the sutras propounded by Shankaracarya Sri Bharati Krishna Tirtha. This Vedic Maths is profound, unifying, flexible, fast and fun. Following the Indian Government's new education policy for the inclusion of Indian culture and values, education departments across India, and elsewhere, are seeking to find how the system of Vedic mathematics can be integrated into the curriculum. Those gathering here have the opportunity to participate in this far-reaching approach to mathematics.

This conference also features presentations of mathematics gleaned from classical and ancient Indian sources, of which there are a many, bringing light to some of the truly remarkable developments from the past.

The event has been brought about through collaborative partnership between the IAVM and Sree Sankara College, Kalady in Kerala. We are gratefully indebted to Dr. Preethy Nair, Principal, for allowing the conference to beheld at Sree Sankara College. We are also indebted for the help and organisation provided by Smt.Essy C Cherian, HOD, Department of Mathematics, Dr. Biju Thomas, HOD, Department of Statistics and Dr. Suvarnani Antherjanam, HOD, Department of Sanskrit.

In several ways, the college is a very fitting venue for a conference on Vedic mathematics. It is situated close to the birthplace of Adi Shankara. Through the board of directors, the administration of the college is steered by Sri Sri Bharathi Theertha Mahaswamigal, the current Shankaracarya at Shringeri Math and it was at Shringeri that Sri Bharati Krishna Tirthaji first discovered and formulated Vedic mathematics just over one hundred years ago.

I would like to thank Devaraj P. for his determined and unstinting support in promoting the conference and managing all the logistics including published material. Without his sustained contribution this conference would not take place.

I also thank the Education Renaissance Trust for its generous sponsorship for this event.

Thanks also go to the presenters who have worked hard to produce papers and presentations on their latest researches and projects. Contributions from overseas include papers from the UK, Australia, Netherlands, USA, the Philippines and Italy. Papers will be presented at the conference and themed along the lines of Mathematics based on the sutras, Vedic Maths in Education and History of Maths in India. There will also be workshops for teachers, children and parents.

I would also like to thank members of the IAVM team for their amazing support and hard work in bringing this conference together. These include, Swati Dave - Co-founder and CEO of IAVM, Ramyanitharshini Balaji, Raghavendra Prasad, Prajakti Gokhale, Gowri Ramachandran and Aditya Yelaru.

Finally, I must also thank you, the delegates, for your enthusiasm and participation. I sincerely hope that you will find the presentations and workshops interesting and enjoyable.

James Glover
Co-Founder & Chairman
IAVM

About the IAVM

The Institute for the Advancement of Vedic Mathematics is a UK based charity established to promote, disseminate, research and support the system of Vedic Mathematics internationally. It is affiliated with the Vedic Maths Academy. The trustees are among the world's leading authorities on Vedic Mathematics and have come together to offer services, host conferences and forums, and to take a lead on the integration of Vedic Mathematics into education through teacher training and the provision of resources. We believe that this approach to Mathematics enables enjoyment for all, develops a high degree of skill and leads to an understanding of the profundity of the subject.

Aims

To promote, sustain and increase individual and collective understanding and research of Vedic Mathematics skills, study and expertise.

To promote the use of Vedic Mathematics in teaching and learning

To research and develop the VM methods and their applications

To support educational groups and organisations in the use of Vedic Mathematics

To develop Vedic Mathematics resources for use in education

To provide courses, seminars, workshops and lectures on Vedic Mathematics

To organise regular international conferences on Vedic Mathematics

To establish and maintain a platform for practitioners of Vedic Mathematics to share their experience, research and development.

The IAVM was founded as recently as 2015 but in that short time has conducted twelve international conferences, four in-person, eight online, as well as numerous courses, workshops and seminars in India, South Africa, Lebanon, Egypt, Iraq and the Philippines. The institute advises and consults with members promoting and teaching Vedic Maths in fifteen countries.

IAVM Publishing has produced seven books, including proceedings from conferences, Teaching & Learning Resources (also translated in Arabic) and Lilavati Poetry Competition winners.

In September of this year IAVM will again be hosting the International Vedic Maths Olympiad - a competition testing speed, mathematical acumen and problem-solving with an emphasis on using Vedic maths sutras. The competition has five levels of entry, at Primary, Junior, Intermediate, Senior and Open.

For details of this and all other events and resources please visit www.instavm.org.

Vedic Mathematics

Shankaracarya Sri Bharati Krishna Tirtha, established sixteen sutras and a similar number of sub-sutras which, he claimed, govern and are applicable to, every aspect of mathematics. He also described several fast and easy methods for calculations and algebraic manipulations leading to the solutions of equations. His seminal book, Vedic Mathematics, was published posthumously in 1965. It is an illustrative volume.

Since then there has been a significant amount of research into the applications and extensions of the mathematics he set out. There are four aspects worthy of mention. The first, and perhaps the most important, is that the approach highlights the personal experience of mathematical thinking. This is because the sutras succinctly describe the natural mental processes that take place when working through any given problem. It is a common feature of the human intellect to find the path of least action. Vedic mathematics provides an orientation that aspires to this. It shows that mathematical problems can usually be solved in many different ways. The art of the solver is to find the easiest or most satisfying path. Fast methods of calculation and algebraic manipulation form only one part of Vedic mathematics. A more meaningful quality is that the sutras provide a substratum for mathematical thinking that unify diverse topics. This is achieved by seeing the same thought pattern or mental process again and again in apparently different areas of the subject.

The second is that the system of Vedic mathematics leads to new ways of learning and developing mathematics. Examples can be seen in Kenneth William's developments in Pythagorean triples, Trigonometry and in his approach to Calculus, in James Glover's work on Coordinate Geometry and Binomial expansions and in Marianne Fletcher's research in finding prime numbers by applying Vedic maths techniques to binary arithmetic. Related to this is the third aspect where "least action" methods are applied to dealing with practical problems such as in engineering. For example, several papers at this conference show how Vedic maths techniques are applied in speeding up computer processing.

The fourth aspect is the development in education. Research shows that using Vedic mathematics in education improves exam results, deepens the understanding of mathematical relationships and provides greater enjoyment of the subject.

It should be pointed out that the name 'Vedic' was explained by the Shankaracarya in the preface of his book as well as in his lectures. He explained that the Vedas are ancient texts that aspire to contain all necessary knowledge, both spiritual and practical. He went on to describe the derivational meaning of "Veda" as knowledge resulting from reasonings or based on "true-realisation by means of actual visualisation". In this sense it follows that Veda is not limited to ancient texts. The Shankaracarya's epithet on this is, "Whatever is consistent with right reasoning should be accepted, even though it comes from a boy or even from a parrot; and whatever is inconsistent therewith ought to be rejected, although emanating from an old man or even from the great sage Sri Shuka himself".

He goes on to say, "we are called upon to enter on such a quest by divesting our minds of all preconceived notions, keeping our minds ever open and, in all humility, welcoming the light of knowledge from whatever direction it may be forthcoming."

Presentations & Speakers

A new approach to the solving of problems of Coordinate Geometry using Vedic Mathematics

Ravi Asrani, Shashikant Chitnis

In this paper we present new techniques of finding solutions of some of lengthy and time consuming problems of Coordinate Geometry with the help of Vedic Mathematics sutras. Problems involving orthocentre and circumcentre of triangles, areas of triangles and parallelograms, reflections of lines, types of triangle and made quick and easy by use of the sutras, Vertically and crosswise (Urdhvatiryagbhyam), Transpose and apply (Paravartya Yojayet) and simple observation (Vilokanam).

Ravi Asrani is a qualified and experienced Maths teacher who has been studying, researching and teaching Mathematics since 1998. He is founder of Omni Academy for Vedic Maths at Indore. Ravi has published research papers and has conducted many Vedic Mathematics workshops in schools and colleges. He is trainer and faculty for Certificate and Diploma courses of Vedic Maths from Atal Bhiari Bajpayi University Bhopal. Presently he is pursuing Ph.D in Vedic Maths from Yoga-Samskrutham University Florida U.S.A.

Perfect Recurring Decimals for Composite Denominators having only Prime Numbers as Factors

Shashikant Chitnis, Ravi Asrani

We all are well aware of finding reciprocals of prime numbers in terms of recurring decimals by using Vedic Mathematics Sutras, Ekadhikena Purvena and Nikhilam Navatascharamam Dashatah, e.g. 1/19. We also know that for numerators from 1 to 18, the recurring decimal digits of 1/19 follow a cyclic order. In the present paper we are dealing with composite denominators having prime numbers as factors. In particular, we deal with the following two types of denominator:
1) having identical prime factors i.e. square of prime number e.g. 289 = 17 x 17 & 361=19 x 19
2) having different prime factors e.g. 119 = 7x17 & 437 = 19x23.

Shashikant is a retired teacher with over 40 years of teaching experience. As well as an MSc in Physics he holds a Diploma in Vedic Mathematics, a subject for which he has a great passion. For past 15 years, Shashikant has been learning, developing Vedic mathematics as well as teaching the methods to students at Atal Bihari University, Bhopal, at their Indore centre. He also works with Ravi Asrani at the Omni Academy for Vedic Maths, Indore.

Quadratic Solutions using Duplex

Muthuselvi Prabhu

Quadratic solutions can be found using various methods including “Vilokanam” (By Mere Observation) and “Calana-Kalanabhyam” (Differential Calculus). Duplex is one of the tools in Vedic Maths which is used to find squares and square roots of numbers and polynomials. This paper shows how the duplex is used to get solutions for general quadratic equations ax2 + bx + c = 0, together with its proof.

By Osculation - An Efficient Tool

Muthuselvi Prabhu

“By Osculation” is a unique method from Vedic Maths which has many applications. The tool used to do osculation is called osculator. There are two types of osculators, positive osculator and negative osculator. This paper shows how osculation is used to find output of a function, quotient and remainder of a polynomial and different base to decimal conversion.

Muthuselvi graduated in B.Sc Electronics in May 2000 and is a certified Vedic Maths trainer under the guidance of Kenneth Williams, Vedic Maths Academy. She has been tutoring Mathematics for grades 6 to 12 since June 2000 and has worked as a part-time Vedic Mathematics teacher in schools as well as an online. Muthuselvie conducts Vedic Math workshops for teachers and gives Vedic Maths lectures in such places as MGR University and Kandasamy Naidu College, Chennai. She is currently writing Vedic Maths books for children from Grade 1.

Mathematical Practices in Tinnai Schools in Tamil Nadu (South India)

Swati Dave

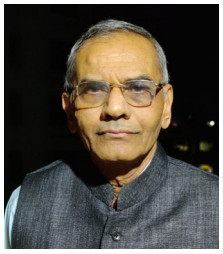
The aim of this paper is to study the mathematical practices in Tinnai schools in the eighteenth and nineteenth century Tamil Nadu (South India) with a closer look at the influence of culture and social order on the curriculum adopted in these schools. The next step will be examining the pedagogical practices that were implemented to support the curriculum, identifying certain distinctive pedagogies, and exploring the possibility of their implementation in the contemporary classroom.

An educator and a project management consultant with over 30 years of experience in the fields of civil engineering, educational publishing, e-learning, and training, Swati has extensive experience of developing VM resources. She has conducted Vedic Mathematics workshops and training programs for students and teachers of all grade levels in India, Europe, Philippines, South Africa, Lebanon, Egypt and the USA. Swati is cofounder and CEO of IAVM.

Baudhayana - Pythagoras Theorem, some Indian Proofs

Dr Shriram Chauthaiwale

It is a settled fact that Baudhyana and other scholars in sulbasutras (before 800 BC) stated the property popularly called Pythagoras theorem (5th century BC).
This paper elaborates on the proofs of this theorem suggested by Kerala (India) scholar Jyeshthadeva (16 th century) in Ganita Yuktibhasha and the four proofs discussed by Swami Bharati K Tirtha Ji in Vedic Mathematics.



Dr Shriram Muralidhar Chauthaiwale. M. Sc. (Mathematics), B. Ed, B. A. (Philosophy), PhD. Lecture (Rt) in Mathematics. Thirty-six years of Teaching & Research experience in Mathematics. Member of Indian Society for History of Mathematics, All India Convener, Vedic Mathematics, Shiksha Sanskruti Nyas, New Delhi, and Chairperson, National Curriculum Focus Group-Mathematics, NCERT, New Delhi. Over 40 research papers published in peer viewed national and international journals, delivered talks, and presented papers at National and International conferences and seminars. Faculty in the number of workshops on VM organized by universities and reputed institutions. Author of 6 books, a radio and 10-episode TV serial on VM for UGC, and speaker in Webinars organized by JNU, Patna IIT, Pune Triple IIT, etc.

Aryabhta's Alpha Syllabic Numeral System and Table of Rsine Differences

Pranab Kumar Bhattacharjee

Aryabhata I composed his major work, the Aryabhatiya, in the year 499 CE, at the age of 23. This book is of the greatest importance in the history of Indian mathematics and astronomy. Written in Sanskrit, it deals with astronomical parameters and tables, mathematics, and measures and movements of the Sun, Moon and planets. The Gitikapada section contains an alpha syllabic numerical code by which words can be transposed into numbers up to 1018. Arybhata uses this code to set out Rsine differences in minutes of arc to incredible accuracy.

This paper explains the alpha numeric code and the Rsine differences.

An ex-banking professional, who founded an educational institute named 'Excel Education' in 2002 with the prime objective of training aspirants for higher studies for entrance exams and job aspirants for various All-India level competitive exams. Trained in Vedic Maths under Mr. Kenneth Williams and became an E-gurukul certified teacher. Passionate about helping young students overcome their fear of numbers through Abacus and Vedic Maths training. Special area of interest is Science and Mathematics in ancient India. Published a book titled "The Vedic System of Mathematics – Superfast Methods" in 2020.

Vedic Mathematics for Aesthetic Education

Laura Aimo

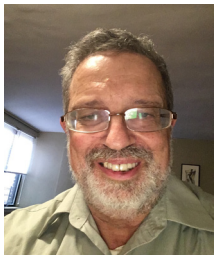
What is the relationship between Vedic mathematics and Aesthetic education? Asking this question means dealing with at least two short circuits related to our common way of thinking.
The first relates to the nature of this relationship. The underlying cognitive model of mathematics is one in which a subject learns, remembers and reproduces an object. But the nature of this mathematical object is still uncertain.
The second short circuit is related to the meaning we commonly give to the term "aesthetic", an adjective often placed in relation to beauty and the arts. Actually, it refers to a much wider field of experience - a branch of philosophy that studies all those processes and products strictly connected to the body: perception, intuition, imagination, taste, feeling.
The paper aims at underlying how these faculties are at stake in Vedic mathematics starting from a very elementary level of investigation.
Taking up the theory of Deleuze and especially Badiou, it will be shown how mathematics is neither physics nor metaphysics, but a fictional actualization of a virtual potential: it is an aesthetic thought.
Ultimately, the paper wants to highlight how the Vedic method offers itself as an example of "Spieltrieb" (Schiller), a game between sensitivity and reason: a practice of creation and freedom, of multiplicity and unity that represents the aim of every authentic aesthetic education.

Research fellow in Aesthetics at the Catholic University in Milan (Faculty of Education). Her field of investigation deals about new pedagogical paths (in particular for kids and teenagers) that take into account our aesthetic faculties: intuition, imagination, taste, feeling, perception, memory. For this reason she is studying Vedic Mathematics and its relevance for a new education. She is author of three book. The last book (written with R. Diodato) is called "Un'idea di educazione estetica" ("An idea of aesthetic education"), Morcelliana – Scholé 2021.

Near Base Multiplication - A Purely Mental Approach, And Faster Than Ever

Nathan Annenberg

As a retired math coach, I still like to dabble in my field, and was revisiting the classic Vedic Maths approach to near-base multiplication. I began to notice some patterns, and soon after I developed a system of algorithms, including my own "sutra", that appears to speed up the process and make it even faster than traditional Nikhilam method.



After retiring from the New York City public school system as a science teacher and math coach, Nathan Annenberg became even more productive as a math coach/consultant for all grade levels: He has his own website, an ebook on out-of-the-box approaches to K-12 math topics, an online course in Vedic approaches to the 4 operations, and three online lessons that greatly extend Vedic Math empowerment in trigonometry with his own insights. Mr. Annenberg continues to take Vedic Math and create entire new universes from it.

Only the Last Terms

James Glover

The purpose of this paper is to look at various applications of the Antyayoreva sub-sutra and use these to establish a broad concept of what the sutra means. The literal meaning is, Only the last two terms but due to the great flexibility of the Vedic maths sutras it can also mean, By the extreme or outer terms. The paper looks at various applications under this broader understanding including the mathematics of limits, expressions, and edges of patterns.
The sutra implies that there are problems that can be solved by merely dealing with the limits or first and last terms of some expression or number.
The paper has three sections. The first deals with simple applications. The second shows how Tirtha introduces the sutra in two areas of higher algebra. Finally, there is a discussion on the meaning of the sutra in its widest context.

Synergy in Vedic Mathematics: Arithmetic and Algebra

James Glover

In Vedic mathematics of Tirthaji, the arithmetic algorithms relate to algebraic principles or an algebraic technique is applied and transposes into and arithmetic method. In respect of pedagogy, many students fail to see the connection between algebra and arithmetic. However, Vedic mathematics brings out and highlights this connection resulting in a deeper understanding of any particular topic. In terms of aesthetics, the synergy between arithmetic and algebra exposes a more unified and satisfying approach. This paper illustrates some of the connections between the arithmetic and algebraic methods.

James has researched and taught Vedic Mathematics for over 40 years and has led international teacher-training programmes, public courses and lectures on the subject in the UK, USA, India and the Philippines. He is Academic Director for the IAVM and has col-led fourteen international conferences. He has written five books and edited six conferences proceedings as well as publications of numerous papers and articles promoting the Vedic system. He has a long experience of curriculum design for Mathematics in schools and colleges.
His work in Vedic mathematics is inspired by simple questions such as, What is number? What is zero? What is shape? What do the sutras really mean? How do they apply?
James is co-founder and Chairman of IAVM.

Vedic Mathematics Sutras and their Relevance

P Devaraj

The Vedic mathematics system is based on 16 sutras and 13 upa or sub-sutras or corollaries and are highly compact. The sutras provide an inherent secrecy, which can be applied in the areas of machine language/coding and also in the area of cyber security. They are simple to remember, easy to understand and easy to apply.
This paper analyses the sutras Nikhilam Navatascaramam Dasatah, Ekanyunena purvena, Urdhva Tiryagbhyam, Anurupyena and Vestanam. This study is in an etymological view point and an attempt at tracing the presence of these sutras and methods in ancient Indian texts.

An automobile engineer by profession, passionately engaged in popularizing Ancient Indian and Vedic Mathematics. Founder of Cosmic Maths Foundation to develop a maths loving generation. Secured Diploma in Vedic Mathematics from Kavikulaguru Kalidasa Sanskrit University. Certified Master Trainer- Skill India. Trained more than 10K students and 1K teachers. Presented papers in 5 International conferences and 3 National conferences on Mathematics education NCME organised by NCERT. Resource person on Vedic Mathematics for NCERT and various other universities and Institutions. Author of Vedic Mathematics- Success Mantras to excel in Mathematics. Recipient of Ramanujan award 2020 for the contribution made to make Maths learning easy.

Further Investigation into Identifying Prime Numbers using Fermat's Little Theorem and the Ekadhikena Purvena Sutra

Marianne Fletcher

Previous papers have explored how the Ekadhikena Purvena Sutra can be employed to generate the recurring decimal (as well as binary) strings for the reciprocals of numbers ending on 1, 3, 7 and 9, and how – having determined the total number of digits before recurrence – Fermat's Little Theorem can be employed to determine whether a particular number is prime or not. This paper briefly discusses the results of further ongoing investigations, whereby it was found that it is unnecessary to find the full cyclic length before recurrence; indeed - having used the Ekadhikena Sutra to generate only the first, say, eight digits in a string – the primality of a number can be confirmed within a high degree of certainty. A new method of eliminating Fermat Pseudoprimes, involving multiples of reciprocal strings, is also introduced.

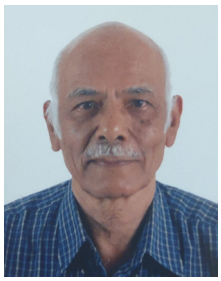
Marianne Fletcher has taught mathematics, physics and chemistry at both high school and tertiary level for over 30 years. She obtained her master's degree in physics at the University of Pretoria in South Africa. She helped start two new schools, and has presented many mathematics and chemistry workshops throughout South Africa, for the Science Unlimited programme. She has done presentations at various science festivals and teacher's workshops, and has published one book called "the Mole Whole". Marianne has had an interest in Vedic mathematics for many years, and has recently written several papers on the subject.

Digital Roots and Power Vaules

Dr Komal Asrani, Vishwanath Unkalkar

Digital root is one of the important concepts of Vedic Mathematics. Also referred to as Beejanka or Seed Number, it had been widely used as a tool for verification of mathematical operations before the development of computers. Here, in this paper, we are proposing the application of digital roots for computation of power values or base values. The computation has been projected based upon the relationship between numbers and digital roots of power values. The relationship has been discussed from different perspectives of digital root of power values and numbers and interesting conclusions are highlighted. Based on the pattern of relationships, we have state the application of the work.

Dr. Komal Asrani has a BTech, MTech, MBA and PhD in Computer Science, Diploma in Vedic Maths and Certificate in Vedic Maths. She has 20 published papers in various International Journals and has presented papers in many conferences. Komal is involved in propagating Vedic Maths using various domains including her website www.vedicmathsjunction.in, and continues to provide workshops and training in schools and colleges. She is presently serving as Professor in Department of Computer Science and Engineering in Lucknow and researches the implementation of Vedic Maths in Computer Science.



V.G.Unkalkar has long experience of research and dissemination of Vedic mathematics. He has authored ten books on the subject, written in English, Marathi and Kannada. He has conducted numerous introductory lectures and workshops in India and USA, and presented research papers at national and international conferences. Vishwanath is associated with Vidya Bharati, SSUN and JKMS Foundation, New Delhi.

History of Negative Numerals and its Constructive Applications in Vedic Mathematics

Prajakti Ghokale

In this research paper, I am going to summarize a brief history of negative numbers in the context of ancient mathematics. I will explore the methods in Vedic mathematics where negative numbers are used constructively. Finally, I will suggest some methodologies which will help students to deal with negative numbers effectively.

For the past 25 years, Prajakti has worked as a freelance educator, facilitator, and teacher of statistics and mathematics - including Vedic and ancient Indian mathematics. Having worked with all types of students and teachers across India, she has extensive experience in designing need-based curricula for colleges, schools, and teacher training programs.

Comparative study between Vedic Method and Gauss elimination Method

Rashmi Yadav, S.R Singh

The present study focuses on using the Vedic mathematics sutras to provide an alternative to the Gauss elimination procedure for solving matrix equations. It was found that the Urdva Tiryagbhyam sutra (Vertically and crosswise) gives an easier and quicker method and is less prone to errors in calculation.

Rashmi Yadav received an MSc degree in 2018 from Dr.Bhim, Rao Ambedkar University in Agra, India. She then completed both a certificate and diploma in Vedic Mathematics, which became her field of study. Rashmi has authored several papers on Vedic mathematics and has a published book to her name. She is currently working as a faculty member in the department of mathematics at Chaudhary Charan Singh University in Meerut.

Thirty-Seven

Angela Pierri

The relation between 37 and 3, namely, that their product is 111, together with the sutras, Proportionately, Sum/Product, Product/Sum and Only the last digits, results in some special techniques for arithmetic calculations. This paper investigates this property and leads to an easy test of divisibility as well as a simple to follow method for dividing a number by 37

"I combine my passion for Vedic Mathematics with psychological training, and I observe the effects of this calculation system on the development and maintenance of the cognitive and emotional functions involved in the learning process. I like to develop calculation strategies and numerical images. I also invented a psychological and didactic tool: the VEDIC LOOM ©, which I presented at the 7th Online Vedic Mathematics Conference (IAVM)."
Angela is a psychologist and psychotherapist by profession and is a certified Vedic Maths Teacher.

Proof of Pascal's Identity using Vedic Mathematics

Chard Aye Alova

After the establishment of the different formulas of Permutations and Combinations with and without Repetitions using the crafts of Vedic Mathematics, one can apply the formulas in proving what are called Combinatorial Identities. One of these said identities is the Pascal's Identity, named after the French mathematician, inventor, and theologian Blaise Pascal. This paper demonstrates the proof of the Pascal's Identity and exhibits its fascinating product, the Pascal's Triangle. This paper features the sutras By One More than the One Before, By One Less than the One Before, At Sight or By Simple Observation, and When the Total is the Same, it is Nought.

Combinatorics in Vedic Mathematics

Chard Aye Alova

Vedic Mathematics is said to capture all of Mathematics, so Statistics and Probability should come under its wide umbrella. One important concept in the study of Probability, also one of great importance in counting a sample size, is the field of Combinatorics, specifically Permutations and Combinations with and without repetitions. Remembering the lengthy formulas of Permutations and Combinations, the Vedic Method offers a much simpler and efficient way of solving them. This paper showcases the firepower of the sutras By One More than the One Before, By One Less than the One Before, By Elimination and Retention on Permutations and Combinations with and without repetitions. The sutra Vertically and Crosswise is also mentioned.

Chard Aye R. Alova is an assistant professor of the University of St. La Salle in Bacolod City, Philippines since 2016. He is currently in the Mathematics Department teaching Math and Statistics courses. He is a National Trainer of Senior High School In-Service Trainings for Statistics and Probability. He is now engaging himself in Vedic Mathematics research and pedagogy, and at the same time, publishing research papers in the field of Mathematics Education. He is a graduate of Bachelor of Secondary Education major in Mathematics and Master of Arts in Education major in Mathematics. He is currently taking up his PhD in Pure Mathematics.

Magic Square in Ancient India using Sanskrit Coding

Usha Sundararaman

The construction of 4th-order magic square is detailed in a work entitled Kaksaputa, probably composed by the philosopher and alchemist Nagarjuna around the 2nd century CE. All of the squares given by Nagarjuna are 4×4 magic squares, and one of them is called Nagarjuniya after him. He gave a method of constructing such a square using a primary skeleton square, given an odd or even magic sum. This paper looks into the method and coding of Sanskrit letters used to produce the squares.

A Comparison of Squaring techniques from Ancient Indian with Bharati Krishna Tirtha's Vedic methods

Usha Sundararaman

In this paper squaring of numbers given by Bhaskara I (commenting on Aryabhatta's method), and three methods given by Bhaskaracharya II in Lilavati, are compared with Bharati Krishna Trithaji's Dvanda Yoga (or the Duplex combination process) which is same as Urdhva Tiryagbhyam (Vertically and Crosswise). Furthermore, the application of some other sutras and sub-sutras, such as Yavadunam (Deficiency) and Anurupyena (Proportionately, can also be mapped to ancient Indian techniques given by Bhaskara II. An iterative process of these two sutras can be applied to squaring numbers of any size.

Usha has 30 years of teaching experience and spent more than 2 decades in Dubai, UAE teaching International curriculum up to A levels. She was certified to be the Adjunct Professor of Mathematics with Syracuse University, New York in 2011. She achieved certification in Dyscalculia run by Dr. Steve Chinn (Associate Membership of the British Dyslexia Association). Usha has been appointed to various leadership roles with GEMS education for 10 years Since, July 2015 she quit formal classroom teaching to become an online tutor with companies Vedantu and she also does freelance teaching in Vedic maths.

Creating a Sudoku Grid using Vedic Maths Sutras

Ramyanitharshini Balaji

For me, Vedic Mathematics is all about finding patterns among numbers.

Inspired by sutras – All from 9 and the last from 10, By one more than the one before, By one less than the one before, All the Multipliers, By mere observation and Digital Root Square (Vedic Square), I figured a process to create a Sudoku (3 x 3 grid - 9 x 9 grid).

This creative transposition fills an entire Sudoku grid from repetition of a process to a 3-digit number. It is possible to have multiple outputs from the same 3-digit number by slightly adapting the process. The purpose is to have fun with numbers while learning and reaffirming the Sutras.

Ramya is a chartered accountant from India and a member of The Association of Certified Chartered Accountants(ACCA) from the UK. She has over 5 years of experience in teaching Vedic Maths in Frankfurt, Germany, and has conducted online workshops for students aged 8 to 13 across Germany, Belgium, and the Netherlands. She has created questions and activities around VM topics that stimulate mathematical and computational thinking.

Implementation of Vedic Sutras to Determine the Characteristic Roots and Corresponding Characteristic Vectors of 4*4 Ordered Matrices

Dr Soniya Gupta, S.R Singh, Nikhil Gupta

Linear algebra is one of the most important branches of mathematics and problems based on this topic can be solved with Vedic Sutras in optimum time duration with perfection. This paper proposes the algorithm to solve a system of linear equations of three or higher order to determine the eigenvalues and corresponding eigenvectors of the given system of linear equations. We applied Vedic Sutras Urdva Tiryagbhyam and Parvartya Yojayet to resolve these kind of problems.

Indian Mathematics in Classical Period Between (400A.D -1200A.D)

Soniya Gupta, Nidhi Handa, Rashmi Yadav

This period is generally known as the golden age of Indian Mathematics. In this period many great Indian mathematicians such as Aryabhatta, Brahmagupta , Bhaskara I, Bhaskara II and Mahaviracharya have given many branches of mathematics .Their contribution spread all over the country and their works included both astronomical and mathematical contributions. In fact, mathematics of that period was included in the 'Astral science' or Jyotish Shastra and its considered as three sub discipline - Mathematical Science (Ganita/Tantra), Horoscope Astrology (Hora or Jataka) and Divination (Samhita).

Dr. Soniya Gupta is head of the Department of Mathematics, Ismail National Mahila PG College, Meerut. She has been awarded by "Women Excellence Award 2022" by Meerut Institute of Technology, Meerut for her contributions in the field of Mathematics, Vedic Mathematics and online education. She is Gold Medalist in Diploma in Vedic Mathematics 2021. Her research area is Operations Research and Vedic Mathematics. She is author/co-author of over 20 Research publications in the leading national and international journals.

Prof. S. R. Singh is professor and Head of the Department of Mathematics, C.C.S. University Meerut. He had been awarded the Saraswati Award, the highest award by the Uttar Pradesh state government for outstanding contribution to higher education in the University category in 2019. He is presently member of National Curriculum Framework (NCF) for developing position paper on topic Mathematics Education and Computation thinking. He is author/co-author of over 250 Research publications in the leading national and international journals.

Dr. Nidhi Handa is Assistant Professor in the Department of Mathematics and Statistics at Gurukul Kangri, Haridwar. She has an MSc and PhD in Statistics. She is a life member of the Indian Society of History of Mathematics, Indian Science Congress Association Haridwar Chapter and member of the Organising Committee of Literature Society Haridwar "AntahPravah". She has published many papers in reputed national and international journals and written two books on ancient Hindu mathematics. Nidhi's particular areas of interest are ancient Indian mathematics, Inventory theory, Wavelets and Statistics.

A Special Method to Square numbers with specific 10s digitJames Glover

Raajesh Srinivasa Rama

This paper provides a simple and elegant approach to find the square of any number with the 10s digit containing 4,6 or 5. A comparison with the Duplex approach of squaring is also provided and the efficiency of this method in terms of reducing the number of computations required to arrive at the result is discussed. It is also possible to extend this approach for numbers having 10s digits other than 4,6 and 5. Use of bar digits to simplify the operation even further is also elaborated.

Extending Tirtaji's Special Multiplication method to multiply near base digits

Raajesh Srinivasa Rama

In this paper, we provide a simple approach to extend the multiplication technique provided by Jagadguru Swami Sri Bharati Krsna Tirthaji in his book on Vedic Mathematics, chapter 2 on Arithmetical computations. The method serves as a great shortcut where the multiplier is near a base. (98, 97 for example). Suitable examples that elucidate this concept are presented and discussed.

Raajesh is a certified trainer in Vedic mathematics and lives in Sydney, Australia. He studied Vedic Mathematics under the guidance of his beloved guru Shri. Kenneth Williams and he teaches the subject with great passion to all age groups – both online and in person. Raajesh possesses profound knowledge on the subject and has written many articles on the subject. Further, he constantly motivates himself to discover newer techniques and to extend the available methods. Apart from teaching Vedic mathematics, Raajesh also works as a Senior Solution Architect in the Telecommunication sector.