



Vedic mathematics: A collection of ancient techniques to solve mathematical problem in easy and faster way

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Abstract:

Vedic mathematics is very ancient Indian technique to solve mathematics problems easily and very fast. Though it is very useful technique for the students, it is not as much popular as modern mathematical techniques. There are 16 Sutras (formulas) and 13 Subsutras of Vedic mathematics. Vedic mathematics was first introduced by Shri Bharati Krishna Tirthaji Maharaja in 19th century. In present study the researcher has presented the history, importance and usefulness of Vedic method.

1. Introduction

Vedic Mathematics is a system of reasoning and mathematical working based on ancient Indian teachings called Veda. It is fast, efficient and easy to learn and use. Vedic mathematics, which simplifies arithmetic and algebraic operations, has increasingly found acceptance the world over. Experts suggest that it could be a handy tool for those who need to solve mathematical problems faster by the day. How fast you can solve a problem is very important. There is a race against time in all the competitions. Only those people having fast calculation ability will be able to win the race. Time saved can be used to solve more problems or used for difficult problems.

2. Introduction to Vedic mathematics

The “Vedic Mathematics” is called so because of its origin from Vedas. To be more specific, it has originated from “Atharva Vedas” the fourth Veda. “Atharva Veda” deals with the branches like Engineering, Mathematics, sculpture, Medicine, and all other sciences with which we are today aware of. The Sanskrit word Veda is derived from the root Vid, meaning to know without limit. The word Veda covers all Veda-Sakhas known to humanity. The Veda is a repository of all knowledge, fathomless, ever revealing as it is delved deeper.

Vedic Mathematics introduces the wonderful applications to Arithmetical computations, theory of numbers, compound multiplications, algebraic operations, factorizations, simple quadratic and higher order equations, simultaneous quadratic equations, partial fractions, calculus, squaring, cubing, square root, cube root and coordinate geometry etc.

This subject was revived largely due to the efforts of Jagadguru Swami Bharathi Krishna Tirtha Ji of Govardhan Peeth, Puri Jaganath (1884-1960). Having researched the subject for years, even his efforts would have gone in vain but for the enterprise of some disciples who took down notes during his last days. The basis of Vedic maths, are the 16 sutras, which attribute a set of qualities to a number or a group of numbers. The ancient Hindu scientists (Rishis) of Bharat in 16 Sutras (Phrases) and 120 words laid down simple steps for solving all mathematical problems in easy to follow 2 or 3 steps. Vedic Mental or one or two line methods can be used effectively for solving divisions, reciprocals, factorization, HCF, squares and square roots, cubes and cube roots, algebraic equations, multiple simultaneous equations, quadratic equations, cubic equations, biquadratic equations, higher degree equations, differential calculus, Partial fractions, Integrations, Pythagoras Theorem, Apollonius Theorem, Analytical Conics and so on.

Vedic scholars did not use figures for big numbers in their numerical notation. Instead, they preferred to use the Sanskrit alphabets, with each alphabet constituting a number. Several mantras, in fact, denote numbers; that includes the famed Gayatri Mantra, which adds to 108 when decoded.

Vedic Mathematics provides answer in one line whereas conventional method requires several steps. It is an ancient technique, which simplifies multiplication, divisibility, complex numbers, squaring, cubing, square and cube roots. Even recurring decimals and auxiliary fractions can be handled by Vedic Mathematics. Vedic Mathematics forms part of Jyotish Shastra which is one of the six parts of Vedangas. The Jyotish Shastra or Astronomy is made up of three parts called Skandas. A Skanda means the big branch of a tree shooting out of the trunk.

In Vedic mathematics System a manual approach is preferred. The simplicity of Vedic Mathematics encourages most calculations to be carried out without the use of paper and pen. Methods like Shudh Method is applicable in statistics. This mental approach sharpens the mind, improves memory and concentration and also encourages innovation.

Once the mind of the student develops an understanding of system of mental mathematics it begins to work more closely with the numbers and become more creative. The students understand the numbers better. Vedic Mathematics is very flexible and creative and appeals to all group of people. It is very easy to understand and practice.

It will be of interest to everyone but more so to younger students keen to make their mark in competitive entrance exams. India's past could well help them make it in today's world. It is amazing how with the help of 16 Sutras & 13 sub-sutras, the Vedic seers were able to mentally calculate complex mathematical problems.

3. Introduction to Shri Bharati Krishna Tirthaji Maharaja

3.1 Early life

Shri Bharathi Krishna Tirthaji Maharaj was born on 14th March 1884 at Tinnievelly, Tamil Nadu. Shri Bharti Krishna Tirtha was known as Venkatraman before he became a saint.

In July 1899 he was awarded the title of 'Saraswati' for all round proficiency and gifted oratory in Sanskrit by the Sanskrit Association of Madras. He had a brilliant academic record with a Masters (MA) degree in six subjects; Sanskrit, English, History, Philosophy, Mathematics and Science from the Bombay Centre of the American College of Science, Rochester, New York.

After a brilliant University career, he became a lecturer in Mathematics and Science in the Baroda College. Thereafter he became Principal of National College in Rajamundry, Andhra Pradesh, India. In 1905 when the Freedom movement started in Bengal, Bharti Krishnaji participated in the freedom movement along with Shri Aurobindo Ghosh and Gopal Krishna Gokhale, an ardent nationalist. Bharti Krishnaji wrote to numerous newspapers propagating the freedom movement. He was also appointed 'Warden of the Sons of India' by Dr. Annie Besant in 1908.

There seemed a devout urge in Him to devote his life in the service of humanity, and he held that man could render such service only after attaining Self Realization. Therefore, he proceeded in 1909 to Shringeri Matha to realize it at the feet of Shri Shankaracharya Shri Sachchidananda Shiva Abhinava Narasimha Saraswati.

3.2 Vedic Mathematics

From 1911-1918 Bharati Krishnaji practiced deep meditation and studied metaphysics and Vedas which led him to practice an arduous life of a Sadhu (saint). He was leading a purely saintly life living

on roots and fruits. His life was continuous “Sadhana” (meditation) and he devoted himself to the study of Vedanta and resorted to the forest for deep meditation and spiritual attainments.

In his solitude he discerned the “Ganita-Sutras” or easy Mathematical Formulas on which he compiled the monumental work “Vedic Mathematics” an original contribution in the field of Mathematics and Research. Bharati Krishnaji got the key to Ganita Sutra coded in the Atharva Veda and rediscovered Vedic Mathematics with the help of lexicographers . He found “Sixteen Sutras” or word formulas which cover all the branches of Mathematics – Arithmetic, Algebra, Geometry, Trigonometry, Physics, plan and spherical geometry, conics, calculus- both differential and integral, applied mathematics of all various kinds, dynamics, hydrostatics and all.

3.3 Later life

Thereafter in July 1919 Sri Venkatraman Saraswati was initiated into Sanyas by Shri Trivikram Teerthaji at Varanasi and since then he was called with the new name “Shri Bharati Krishna Tirtha”. Shri Bharati Krishna Tirthaji Maharaja was a staunch follower of the Vedic Principles and he never went astray from its rules. He was appointed as the Head of Dwarkapeeth by Shri Trivikram Tirthaji in 1921. Since then, He started the life of Shankaracharya and delivered discourses wherever he went. In 1925 he became the Head of the Govardhan Matha Monastery in Puri, Orissa and was the pontiff till 1960 the year of his “Maha Samadhi” (departure of a Self-realized saint from his mortal coil.) Because of His Holiness’s spiritual authority over millions of Hindus, the Government of India consults the Jagadguru on policies relating to spiritual rules and Hindu Religious Matters.

3.4 USA Tour

In 1958, His Holiness Sri Jagadguru Shankaracharya of Puri, Head of the thousand year old monastic Shankaracharya Order and the first of its leaders ever to visit the west, went for a three month tour of the United States and the United Kingdom on an invitation by the Self Realization Fellowship (SRF) founded by Paramhansa Yogananda. The tour was hosted by Sister Daya Mata the President of the SRF.

He spoke at various lectures attended by thousands of students of various universities and organizations such as Stanford University, University of California, San Diego College, Vedanta Society Hollywood, Church of Religious Science- Los Angeles, Los Angeles City College, and American Academy of Asian Studies, etc.

He addressed a selected group of Caltech graduate students in mathematics at California Institute of Technology. He was introduced by Mr. Wesley L.Hershey executive secretary of Caltech YMCA and thereafter Bharati Krishnaji discoursed and gave black board demonstrations. This meeting was the first in the United States in which His Holiness presented his mathematical discoveries. The talk aroused such interest that His Holiness was invited to return to the institute for further demonstrations. A turn of events brought His Holiness back to Caltech. In his second discourse he took up Algebra and Quadratics; and a third discourse at Caltech Sri Sankaracharya demonstrated the application of his theories in the field of Calculus.

4. Sutras and Subsutras of Vedic Mathematics

Vedic Mathematics is a collection of Techniques/Sutras to solve mathematical arithmetic in easy and faster way. It consists of 16 Sutras (Formulae) and 13 sub-sutras (Sub Formulae) which can be used for problems involved in arithmetic, algebra, geometry, calculus, conics.

4.1 Sutras of Vedic Mathematics

There are 16 sutras in Vedic mathematics. Name of these sutras and meaning of its are mentioned in table 1.0.

Table 1: Sutras and their meanings

No.	Sutras	Meaning
1	एकाधिकेन पूर्वेण	By one more than the one before
2	निखिलं नवतः चरमं दशतः	All from 9 and the last from 10
3	ऊर्ध्व-तिर्यग्भ्याम्	Vertically and Crosswise
4	परावर्त्य योजयेत्	Transpose and Apply
5	शून्यं साम्यसमुच्चये	If the Samuccaya is the Same it is Zero
6	आनुरूप्ये शून्यमन्यत्	If One is in Ratio the Other is Zero
7	संकलन व्यवकलनाभ्याम्	By Addition and by Subtraction
8	पूरणापूरणाभ्याम्	By the Completion or Non-Completion
9	चलनकलनाभ्याम्	Differential Calculus
10	यावदूनम	By the Deficiency
11	व्यष्टिसमष्टिः	Specific and General
12	शेषाण्यङ्केन चरमेण	The Remainders by the Last Digit
13	सोपान्त्यद्वयमन्त्यम्	The Ultimate and Twice the Penultimate
14	एकन्युनेन पूर्वेण	By One Less than the One Before
15	गुणितसमुच्चयः	The Product of the Sum
16	गुणक समुच्चयः	All the Multipliers

4.2 Subsutras of Vedic Mathematics

There are 13 Subsutras in Vedic mathematics. Name of these sutras and meaning of its are mentioned in table 2.0.

Table 2 :Subsutras and their meanings

No.	Sutras	Meaning
1	आनुरूप्येण	Proportionately
2	शिष्यते शेषसंज्ञः	The Remainder Remains Constant
3	आद्यं आद्येन अन्त्यम् अन्त्येन	The First by the First and the Last by the Last
4	केवलैः सप्तकं गुण्यात्	For 7 the Multiplicand is 143
5	वेष्टनम्	By Osculation
6	यावदूनं तावदूनम्	Lessen by the Deficiency
7	यावदूनं तावदूनीकृत्य वर्गं च योजयेत्	Whatever the Deficiency lessen by that amount and set up the Square of the Deficiency
8	अन्त्ययोर्दशकेऽपी	Last Totalling 10
9	अन्त्ययोरेव	Only the Last Terms
10	समुच्चयगुणितः	The Sum of the Products
11	लोपनस्थापनाभ्याम्	By Alternate Elimination and Retention
12	विलोकनम्	By Mere Observation
13	गुणितसमुच्चयः समुच्चयगुणितः	The Product of the Sum is the Sum of the Products

5. Uses of Vedic mathematics

The uses of Vedic mathematics are as follows:

1. More than 1700% times faster than normal Math: this makes it the World's Fastest.
2. Eradicates fear of Math completely. So, If child has Math-Phobia High Speed Vedic Math is a Fun-Filled way to do Math and arises interest in the child.
3. Much Improved Academic Performance in School and Instant Results.

4. Sharpens students' mind, increases mental agility and intelligence.
5. Increases speed and accuracy. Become a Mental Calculator yourself.
6. Improves memory and boosts self-confidence.
7. Cultivates an Interest in mathematics.
8. Develops left and right sides of brain hence using intuition and innovation. It has been noted that Geniuses have been using the right side of the brain to achieve exceptional results.
9. Easy to master and apply. Students just need the knowledge of tables to learn this.
10. Vedic Maths Techniques/Sutras have the maths tricks for fast calculation and can be used in exams like CAT, CET, SAT, Banking Exams, etc.

6. Importance of Vedic Mathematics

Many Indian Secondary School students consider Vedic Mathematics a very difficult subject. Some students encounter difficulty with basic arithmetical operations. Some students feel it difficult to manipulate symbols and balance equations. In other words, abstract and logical reasoning is their hurdle. The importance of Vedic Mathematics is as follows:

11. Vedic Mathematics, derived from the Veda, provides one line, mental and superfast methods along with quick cross checking systems.
12. Vedic Mathematics converts a tedious subject into a playful and blissful one which student learn with smiles.
13. Vedic Mathematics offers a new and entirely different approach to the study of Vedic Mathematics based on pattern recognition. It allows for constant expression of a student's creativity, and is found to be easier to learn.
14. In this system, for any problem, there is always one general technique applicable to all cases and also a number of special pattern problems. The element of choice and flexibility at each stage keeps the mind lively and alert to develop clarity of thought and intuition, and thereby a holistic development of the human brain automatically takes place.
15. Vedic Mathematics with its special features has the inbuilt potential to solve the psychological problem of Vedic Mathematics—anxiety. The Vedic Methods enable the practitioner improve mental abilities to solve difficult problems with high speed and accuracy.
16. Helps student to apply the sutras to specific problems involving rational thinking, which, in the process, helps improve intuition that is the bottom—line of the mastery of the mathematical geniuses of the past and the present such as Aryabhata, Bhaskaracharya, Srinivasa Ramanujan, etc. One line, mental and super fast methods along with quick cross checking systems.
17. Converts a tedious subject into a playful and blissful one which students learn with smiles.
18. Constant expression of a student's creativity, and is found to be easier to learn.
19. Ensure both speed and accuracy, strictly based on rational and logical reasoning through application of the sutras leading to improvement in the computational skills of the learners in a wide area of problems.
20. Helps to solve the psychological problem of Vedic Mathematics anxiety.

7. Conclusion

For some students, mathematics is boring and tough subject. Vedic mathematics makes its easy and fast too. Time of mathematical problems solving through Vedic mathematics takes very little time in compared to modern mathematical techniques. In present conceptual study, the researcher has tried to importance and usefulness of Vedic mathematics.

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