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Unveiling Vedic Mathematics: An Introduction to its Features and Benefits

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Abstract:

Vedic mathematics is a system of mathematical techniques based on 16 sutras (aphorisms) and 13 subsutras that are believed to originate from the ancient Indian scriptures known as the Atharva Veda. The system was rediscovered and popularized in the 20th century by Bharati Krishna Tirthaji. His work Vedic mathematics presented various mental calculation methods for solving mathematical problems quickly and efficiently. This article explores the origin, principles, features and educational benefits of Vedic mathematics.

The study highlights how Vedic mathematical techniques simplify complex calculations through pattern recognition, mental strategies, and flexible problem-solving methods. Unlike conventional mathematical approaches, Vedic mathematics emphasises mental computation, creativity, and logical thinking. The system is applicable to a wide range of mathematical areas, including arithmetic operations, algebra, factorization, equations and even advanced topics such as calculus.

Furthermore, the article discusses the major features of Vedic mathematics, including coherence, flexibility, mental development and enhanced creativity among learners. The benefits of the system include increased calculation speed, improved concentration, better memory, and strong problem-solving skills. Due to its simplicity and efficiency, Vedic mathematics has gained recognition as a supportive tool in mathematics education across different parts of the world.

Although debates exist regarding its historical origins and its direct connection to the Vedas, Vedic mathematics continues to attract attention for its innovative and practical

computational techniques. The article concludes that integrating Vedic mathematics into educational curricula could help reduce students' fear of mathematics and promote greater interest and confidence in learning the subject.

Keywords: Vedic Mathematics, Veda, Sutras, sub-Sutras, problem solving skills.

INTRODUCTION

The “Vedic Mathematics” mentioned at Fundamentals and Applications of Vedic Mathematics (2014), is called so because of its origin from Vedas. To be more specific, it has originated from “Atharva Veda” 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 word “Veda” has two basic meanings: the first, a literal translation of the Sanskrit word, is “knowledge”, and the second and the most common meaning of the word, refers to the sacred ancient literature of Hinduism. The Vedas, a collection of hymns, poetry and Hindu ceremonial formulae, believed to be one of the oldest human written records, the Vedas date back over 4000 years.

The Vedas are divided into four main sections: the Rig-Veda, the Sama-Veda, the Yajur-Veda and the Atharva-Veda, known collectively as the Samhitas. The first three, the Rig-Veda, the Sama-Veda and the Yajur-Veda are basically ritual handbooks that were used by priests during the Vedic period (1500-500 BCE). Vedic mathematics is apparently part of the fourth Veda- the Atharva-Veda, which is distinct from the others in several ways. First, unlike the religious focus of the other Vedas, the Atharva-Veda contains hymns, spells and magical incantations for personal and domestic use. Also, the Atharva-Veda, which was written later than the other Vedas, was not always considered authoritative, but only became so after being accepted by the Brahmins, the highest order of Hindu priests. Collectively, the Vedas include information about a huge range of subjects, spanning religion, medicine, architecture, astronomy etc.

Vedic mathematics is our ancient mathematics. They are called “Vedic” as because the sutras are said to be contained in the Atharva-Veda, a branch of mathematics and engineering in the ancient Hindu scriptures. All our modern-day mathematics is based on Vedic mathematics. It is the origin of all mathematics. It is a skill of doing all mathematics calculations very fast. It is the mathematics of Veda. It is a dynamic quality of Veda, embedded in eternal silence. It is inherent in the structure of pure knowledge. It is the absolutely precise organizing power inherent

in the structure of pure knowledge. It is the sovereign ruler of the universe; it is the commander of Natural law.

Vedic mathematics is a system of mathematics consisting of a list of 16 basic sutras (or aphorisms) and 13 sub-Sutras. All our modern mathematics is based on Vedic mathematics. It is the origin of all mathematics. It was founded by **Swami Sri Bharati Krishna Tirthaji Maharaja (1884-1960)**, during the early part of the 20th century, who was the Sankaracharya (Monk of the highest order) of Govardhan Matha in Puri. He was an exceptional scholar; by age of twenty, he had studied at a number of colleges and universities throughout the country, been awarded the title of ‘Saraswati’ by the Madras Sanskrit Association for his remarkable proficiency in Sanskrit, and had completed seven master degrees, including Sanskrit, Philosophy, English, Mathematics, History and Science, with the American college of sciences.

In Sanskrit, the term Sutra means ‘Thread of Knowledge’ or ‘A set of rules.’ Vedic mathematics consists of 16 Sutras and 13 sub-Sutras. The meaning of these Sutras and sub-Sutras is tabulated below, Jagad Guru(1965).

Sixteen Sutras

S. N.	Sutras	Meaning
1.	एकाधिकेन पूर्वेण Ekadhikena Purvena	One more than the previous one
2.	निखिलं नवतश्चरमं दशतः Nikhilam Navatascaramam Dasatah	All from 9 and last from 10
3.	उर्ध्वतिर्यग्भ्याम् Urdhva-tiryagbhyam	Criss-cross (Vertically and cross-wise)
4.	परावर्त्य योजयेत् Paravartya Yojayet	Transpose and adjust (Transpose and apply)
5.	शून्यं साम्यसमुच्चये Sunyam Samyasamuccaye	When the samuchchaya is the same, the samuchchaya is zero, it should be equated to zero
6.	(आनुरुप्ये) शून्यमन्यत् (Anurupye) Sunyamanyat	If one is in ratio, the other one is zero
7.	संकलनव्यकलनाभ्याम् Sankalana-vyavakalanabhyam	By addition and by subtraction
8.	पूरणापूरणाभ्याम् Puranapuranabhyam	By the completion or non-completion

9.	चलनकलनाभ्याम् Calana-kalanabhyam	By calculus
10.	यावदूनम् Yavadunam	By the deficiency
11.	व्यष्टिसमष्टिः Vyastisamastih	Specific and general (Use the average)
12.	शेषाण्यकेन चरमेण Sesanyankena Caramena	The reminders by the last digit
13.	सोपन्त्यद्वयमन्त्यम् Sopantyadwayamantya	The ultimate and twice the penultimate
14.	एकन्यूननेन पूर्वणेन Ekanyunena Purvena	By one less than the previous one
15.	गुणितसमुच्चयः Gunitasamuccayah	The product of the sum of coefficients in the factors (The whole product)
16.	गुणकसमुच्चयः Gunakasamuccayah	Set of multipliers

Thirteen sub-Sutras

S. N.	Sutras	Meaning
1.	आनुरूपेण Anurupena	Proportionately
2.	शिष्यते शेषसंज्ञः Sisyate Sesasangya	The remainder remains constant
3.	आध्यमाध्येनान्त्यमन्त्येन Adyamadyenantyainantyaena	The first by the first and last by the last
4.	केवलैः सप्तकं गुण्यात् Kewalaih saptakan gunyat	In case of 7, our multiplicand should be 143
5.	वेष्टनम् Vestanam	By osculation
6.	यावदूतं तावदूनम् Yawadutam tawadunam	Lessen by the deficiency
7.	यावदूनं तावदूनीक्रित्यवर्गं च योजयेत् Yawadunam Tawadunikritya Varganca yojayet	Whatever the extent of its deficiency, lessen it still to that very extent; and also set up the square of that deficiency

8.	अन्त्ययोर्दशकेऽपि Antyayordasake'pi	Whose last digits together total 10 and whose previous part is exactly the same
9.	अन्त्ययोरेद Antyayoreda	Only the last terms
10.	समुच्चयगुणितः Samuccayagunitah	The sum of the coefficients in the product
11.	लोपस्थापनाभ्याम् Lopasthapanabhyam	By alternate elimination and retention
12.	विलोकनम् Wilokanam	By observation
13.	गुणितसमुच्चयः समुच्चयगुणितः Gunita Samuccayah Samuccayah Gunita	The product of sum of the coefficients in the factors is equal to the sum of the coefficients in the product

Swami Sri Bharati Krishna Tirthaji Maharaja claimed that he founded the sutras after years of studying the Vedas, a set of sacred ancient Hindu texts. However, Vedas do not contain any of the “Vedic mathematics” sutras. The calculation strategies provided by Vedic mathematics are said to be creative and useful, and can be applied in a number of ways to calculation methods in arithmetic and algebra, most notably within the education system.

One of the key principles of Vedic mathematics is the concept of sutras, which are unique mathematical aphorisms that encapsulate various mathematical techniques. These sutras provide methods to perform calculation mentally, without the need for extensive written work. By employing these sutras, complicated calculations can be simplified and calculated quickly, Williams, K. R. (1984).

Vedic mathematics is a curriculum which provides multidimensional thinking ability to human brain. It helps in developing self-confidence, too. Vedic mathematics approach results into a terrific performance and help children to solve all mathematical questions faster and quicker hence proves a boon to overcome the fear of mathematics. Vedic mathematics equips us with intellectual one-line formula which speeds up calculation. It is a much more organized, consistent and united system than the conventional mathematical system. It is a mental tool for calculation that encourages the development and use of perception and originality, while giving the student a lot of flexibility, fun and satisfaction. Practicing Vedic mathematics is said to have

immense benefits including an increase in mental capacity and processing speed in the brain. In recent years, the concept of Vedic mathematics has become more well-known, and its advantages are widely acknowledged.

Vedic mental methods can be used effectively for divisions, reciprocals, factorization, HCF, square and square roots, cubes and cube roots, algebraic equations, multiple simultaneous equations, quadratic equations, cubic equations, bi-quadratic equations, higher degree equations, differential calculus, partial fractions, integrations, Pythagoras theorem, analytical conics and so on.

One of the significant advantages of Vedic Mathematics is its applicability to both basic and advanced mathematical problems. It offers techniques that can be applied to everyday calculations, as well as to more advanced mathematical concepts. The system also promotes mental agility, sharpening the mind and improving problem-solving skills.

Vedic Mathematics has gained popularity worldwide and has been incorporated into some educational systems as an additional tool for teaching mathematics. Its simplicity and efficiency make it a valuable resource for students, teachers, and anyone interested in mathematics.

It's worth noting that while Vedic Mathematics has been praised for its mental calculation methods and efficiency, its historical connection to the Vedas and its claims of being a complete mathematical system have been subjects of debate among mathematicians and scholars. Nevertheless, Vedic Mathematics continues to be studied and practiced by enthusiasts seeking alternative mathematical approaches.

One can be taught Vedic mathematics from an early age. Vedic mathematics is not linear unlike conventional mathematics. This is because the processes are governed by an internal relationship between numbers rather than by external method of conventional mathematics.

FEATURES OF VEDIC MATHEMATICS

There are many features of the Vedic mathematics which contrast significantly with conventional mathematics.

- i. **Coherence-** The most striking feature of the Vedic mathematics is its coherence. Instead of an assortment of unrelated techniques, the whole system is beautifully interrelated and unified. The unifying quality is very satisfying. It makes mathematics easy and enjoyable and encourages innovation.

- ii. **Flexibility-** In modern teaching, we usually have one way of doing a calculation. This is rigid and boring. Intelligent and creative students rebel against it. In the Vedic system, there are special methods that apply in special cases and also general methods. The Vedic system has many special methods, when a calculation has some special characteristics that can be used to find the answer more easily. This flexibility adds to the fun and gives of pupils the freedom to choose their own approach. This in turn leads to the development of creative and intuition. The Vedic system does not insist on a purely analytic approach as many modern teaching methods do. This makes a big difference to the attitude which children have towards mathematics. In this rapidly changing world, adaptability and flexibility are absolutely essential for success. For the future, we can expect more change and perhaps at a more rapid pace.
- iii. **Mental, improves memory-** The ease and simplicity of Vedic mathematics means that calculations can be carried out mentally. There are many advantages in using a flexible, mental system. Pupils can invent their own methods. This leads to more creative, interested and intelligent pupils. It also leads to improve memory and greater mental agility.
- iv. **Promotes creativity-** All these features of Vedic mathematics encourage students to be creative in doing their mathematics. Being naturally creative, students like to devise their own methods of solution. The Vedic system seeks to cultivate intuition, having a conscious proof or explanation of a method beforehand is not essential in the Vedic methodology.
- v. **Appeals to everyone-** The Vedic system appears to be effective over all ability ranges: the able child loves the choice and freedom to experiment and the less able may prefer to stick to the general methods but loves the simple patterns they can use.
- vi. **Increases mental agility-** As the Vedic system uses the ultra-easy methods, mental calculation is preferred and leads naturally to develop mental agility and this in turn leads to growth in other subjects.
- vii. **Efficient and fast-** In the Vedic system ‘difficult’ problems or huge sums can often be solved immediately. These striking and beautiful methods are just a part of a complete system of mathematics which is far more systematic than the modern system. Vedic mathematics manifests the coherent and unified structure naturally inherent in mathematics and the methods are direct, easy and complementary.
- viii. **Easy and fun-** The experience of the joy of mathematics is an immediate and natural consequence of practicing Vedic mathematics. And this is the true nature of mathematics- not the rigid and boring system that is currently widespread.

- ix. **Methods apply in algebra-** Another important feature of the Vedic system is that once an arithmetic method has been mastered, the same method can be applied to algebraic of that type- the beautiful coherence between arithmetic and algebra is clearly manifest in the Vedic system.

Benefits of Vedic Mathematics

Vedic mathematics is systematic, simplified and unified than the conventional system. It is a mental tool for calculation that encourages the development and use of intuition and innovation, while giving the student a lot of flexibility, fun and satisfaction. Vedic mathematics is easy to implement in school and colleges. That is one of the reasons it is getting enormous popularity among academicians.

The calculation strategies provided by Vedic mathematics are creative and useful, and can be applied in a number of ways to calculation methods in arithmetic and algebra, most notably within the education system. The most notable application of Vedic mathematics is in education. Vedic mathematical strategies may prove to be a useful resource for teachers and students, who may find elements of it easier and more accessible to teach and learn than conventional mathematics.

Vedic Mathematics offers several advantages that make it a valuable approach to learning and practicing mathematics. Here are some of the key advantages of Vedic Mathematics:

- i. **Speed and Efficiency-** One of the key advantages of Vedic mathematics lies in its efficiency and speed. Vedic Mathematics provides mental calculation techniques that enable faster and more efficient computations. By employing sutras and mental algorithms, complex calculations can be simplified and performed swiftly. The system emphasizes pattern recognition, symmetry and coherence, allowing for the simplification of intricate problems Sharma, V. (2007). This speed and efficiency have practical applications in various fields, from engineering and finance to competitive exams and time-constrained situations to everyday calculations.
- ii. **Simplicity and Versality-** Vedic Mathematics emphasizes simplicity in its methods, making it easier for students to understand and apply mathematical concepts. The system offers alternative approaches and shortcuts for arithmetic, algebra, geometry and calculus that can simplify complex problems, reducing the burden of lengthy calculations. Moreover, the system promotes flexibility and applicability allowing students to tackle a wide range of mathematical problems using a unified set of methods, Bharati, S. (2010).

This versatility makes Vedic mathematics an invaluable tool in both basic and advanced mathematical studies.

- iii. **Mental Calculation Skills-** Vedic Mathematics focuses on mental calculation techniques, reducing the reliance on calculators or written work. It enhances mental agility, improves concentration, and sharpens problem-solving skills. This mental stimulation improves concentration, enhances critical thinking abilities, and promotes a deeper understanding of mathematical principles. These mental calculation abilities can be useful in various real-life situations, where quick and accurate calculations are required.
- iv. **Flexibility and Applicability-** Vedic Mathematics is not limited to specific areas of mathematics but covers a wide range of topics, from basic arithmetic to advanced algebra and calculus. The techniques can be applied to various mathematical problems, making it a versatile approach. This flexibility allows students to tackle different types of mathematical challenges using a unified set of methods.
- v. **Improved Mathematical Fluency-** By practicing Vedic Mathematics techniques, students develop a deeper understanding of mathematical concepts and relationships. The system encourages pattern recognition, symmetry, and coherence, enabling students to see connections between different mathematical operations. This enhanced mathematical fluency can lead to improved problem-solving skills and critical thinking abilities.
- vi. **Engaging and Interactive Learning-** Vedic Mathematics incorporates interactive methods and visual aids to make learning more engaging and enjoyable. The system encourages students to actively participate in solving problems and exploring mathematical patterns. This hands-on approach can enhance interest and motivation in learning mathematics.
- vii. **Cultural and Historical Significance-** Vedic Mathematics has its roots in ancient Indian culture and draws inspiration from the Vedas, which are ancient Hindu scriptures. Studying Vedic Mathematics provides an opportunity to explore and appreciate the rich mathematical heritage of ancient India. It also offers a unique perspective on mathematics, different from conventional methods.

While Vedic Mathematics has its advantages, it's important to note that its historical claims and its status as a complete mathematical system have been subjects of debate among mathematicians and scholars. Nonetheless, the system continues to be studied and practiced by enthusiasts as an alternative and complementary approach to conventional mathematics, Joseph, H. (1976).

Conclusion

Vedic Mathematics represents a unique and efficient approach to understanding and performing mathematical calculations. It emphasizes simplicity, speed, and mental agility. Through its system of sutras and sub-sutras, it provides alternative methods that make mathematical problem-solving more intuitive, flexible, and engaging.

Despite ongoing debates regarding its historical origins and claims, Vedic Mathematics has proven to be a valuable complementary tool in education. It enhances students' confidence, encourages creativity, and promotes a deeper understanding of mathematical concepts. Overall, Vedic Mathematics not only simplifies mathematics but also transforms it into an enjoyable and meaningful subject. Its continued relevance in modern education highlights its potential to bridge traditional knowledge with contemporary learning practices, making mathematics more accessible and appealing to learners of all levels.

Many research programs are being carried out in different fields. These studies aim to understand how learning Vedic mathematics affects children and to create simpler and more useful ways to apply Vedic sutras in areas like geometry, calculus, and computing. As Vedic mathematics is becoming more popular, the government of Nepal should include it in the school curriculum.

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