



Vedic Mathematics: History, Techniques, Applications, and Modern Relevance

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Abstract:

Vedic Mathematics, a technique derived from ancient Indian Vedic literature, offers new arithmetic, algebraic, and geometric methods. Sri Bharati Krishna Tirthaji brought Vedic Mathematics back to life during the early 20th century by establishing its core concept of 16 sutras and 13 sub-sutras operated as mental calculation methods. This paper maps its history, core principles, and applications in education, computer science, and finance. It also proves its efficacy over conventional practices, solves controversies of its advent, and discusses its applications in modern research and technology.

Keywords: *Vedic Mathematics, Vedic Literature, Arithmetic, Algebraic, Geometric.*

Introduction

➤ Historical context

Origins: Vedic Mathematics is generally linked to the Atharva Veda, but authors argue that its approach is not described in specific places in ancient writings but comes from Vedic philosophy (Plofker, 2009). The term “Vedic Mathematics” was coined by Sri Bharati Krishna Tirthaji (1884–1960), a Sanskrit scholar and mathematician, who claimed to reconstruct lost mathematical knowledge from the Vedas (Tirthaji, 1965). The term “Vedic” signifies the philosophical depth and intuitive nature of the system rather than its literal origin (Williams, 1991).

Discovery: Sri Bharati Krishna Tirthaji (1884–1960) structured 16 sutras in his book Vedic Mathematics to demonstrate mathematical solution approaches for arithmetic and algebra while working as a scholar and Shankaracharya of Govardhan Matha. Tirthaji presented two multiplication methods which focus on easy and fast computation within Vedic Mathematics. One of them is the Nikhila Sutra.

Controversies: The origin of Vedic Mathematics as an ancient mathematical system remains in dispute because critics believe it emerged in the twentieth century according to Raju (2007). It has pedagogical worth according to proponents even if they accept or reject its historical legitimacy (Williams, 2020).

➤ Core Principles

The Sixteen Sutras: The Vedic system is based on sixteen sutras, which is a collection of general rules or procedures for solving mathematical problems. A very good example is using “*Ekadhikena Purvena*” (By

one more than the previous) to square numbers ending in 5, while “*NikhilamNavatashcaramamDashatah*” (All from 9 and the last from 10) is used to do rapid multiplication and subtraction (Tirthaji, 1965).

Sub-Sutras (Corollaries): Along with the main sutras are thirteen sub-sutras, which provide additional explanation and are useful in specific situations. The sub-sutras help with exceptions and culminate into step-by-step calculations, facilitating an intuitive understanding of problem-solving (Williams, 1991).

Emphasis on Mental Calculation: Yet another feature of Vedic Mathematics is its emphasis on mental calculation. The methods have a tendency to split complex operations into simple mental procedures, enabling speed and accuracy, and facilitating improved mathematical patterns (Glover, 2006).

➤ Significance and Scope

Aims and Objectives: The main aim of Vedic Mathematics is to simplify mathematical calculations and enhance the confidence level of students by reducing reliance on mechanical methods. It makes it possible for an integrated learning process with the integration of logic, imagination, and intuition (Tirthaji, 1965; Glover, 2006).

Overview of Topics: Subsequent sections of this paper explain some of the various Vedic techniques in arithmetic, algebra, and geometry; compare them to conventional methods; and discuss how they can be applied in education, computer science, and other areas. The paper concludes by evaluating the modern relevance and future potential uses for research and innovation in this field.

Techniques of Vedic Mathematics

➤ Arithmetic Operations

Addition and Subtraction: The Vedic method performs calculations by doing computation left to right while using additional numbers as aids. Quick subtraction requires the “*Nikhilam*” sutra which helps achieve results by complementing numbers to a near base according to Tirthaji (1965).

Multiplication: Through the Vedic methodology numbers are sorted into separate parts for multiplication operations. Through the “*Vertically and Crosswise*” method users can perform two-digit multiplications by computing separate digits of the numbers and combining their partial product results (Williams, 1991).

Division: The “*Paravartya*” sutra helps perform division by successive subtraction so students can avoid excessive use of long division (Glover, 2006).

Squaring and Cubing: The “*Ekadhikena Purvena*” sutra enables the squaring of numbers ending with 5 through base number addition followed by square addition of 25 to the resultant value (Tirthaji, 1965).

➤ Algebra

Solving Equations: “*Sunyam Samyasamuccaye*” solves quadratic equations by balancing terms (Kansara, 2000). Vedic techniques provide an alternative to conventional algebraic methods, such as factorization using the “*Vilokanam*” sutra (Williams, 1991).

Factorization: “*Lopana Sthapanabhyam*” (elimination and retention) factors polynomials (Tirthaji, 1965). Using the “*Yavadunam*” sutra, complex expressions can be factorized mentally by identifying near-base terms (Glover, 2006).

➤ Geometry

Applications in Geometry: Vedic Mathematics is also relevant to geometric constructions, such as calculations of areas and volumes using mental shortcuts (Tirthaji, 1965).

Relevance to Shulba Sutras: Ancient Vedic texts describe geometric constructions for altars, including the Pythagorean Theorem (Ammann, 1999). There are geometric concepts in ancient Shulba Sutras that are harmonious with Vedic Mathematics, indicating Indian contributions to mathematical thought early in history (Williams, 1991).

Comparative Analysis

➤ Vedic Mathematics Vs Conventional Mathematics

Efficiency: Vedic Mathematics makes calculations quicker in most instances compared to conventional methods. Mental strategies of the system reduce paper and calculator usage and thus are convenient for competitive exams and quick calculations (Glover, 2006). Studies show Vedic methods reduce steps by 30–70% for arithmetic (Kumar & Prasad, 2016).

Conceptual Understanding: The system facilitates extended understanding of number sense and encourages elastic thinking. In contrast to procedural knowledge via conventional methods, Vedic Mathematics focuses on pattern observation and intuitive awareness (Williams, 1991). It also encourages pattern recognition over rote memorization (Stiller, 2019).

Flexibility: Students can solve a problem in different ways, based on the situation and types of numbers involved. This flexibility makes problem-solving better and promotes innovative mathematical thinking (Kumar, 2004). It is adaptable to diverse problem types but criticized for lacking formal proofs (Raju, 2007).

➤ Advantages and disadvantages

Advantages: Some of the key benefits are increased mental agility, increased mathematical confidence, and enjoyment and stimulation as a learning process. It is also useful at exam time due to its fast and short-cut based approach (Glover, 2006). Pathak (2021) acknowledges the advantage as speed, creativity and reduced math anxiety.

Shortcomings: One criticism of Vedic Mathematics is that it is not exhaustive as regards high-level mathematics like calculus or linear algebra. Also, some sutras can seem illogical unless the conceptual foundation is present (Kumar, 2004). According to Plofker (2009), it has limited applicability to higher mathematics.

Applications

➤ Education

Building Mathematical Abilities: Vedic Mathematics has been utilized to build numeracy skills and improve mental calculation, especially in middle school and primary school levels (Williams, 1991).

Integration of Curriculum: Various schools have included Vedic Mathematics in the curriculum or enrichment to promote mathematical interest and performance (Glover, 2006).

Overcoming Math Anxiety: Math anxiety students perceive the methods as being within reach since they are easy and logically sequential, thus promoting a more positive attitude towards mathematics (Kumar, 2004).

➤ **Computer Science**

Algorithm Design: Certain algorithms based on Vedic principles, such as high-speed multiplication and division, have their applications in computational speed and hardware design (Saxena & Kumar, 2011). “*Urdhva-Tiryagbhyam*” optimizes binary multiplication in cryptography (Datta, 2017).

Cryptography: Researchers have attempted to seek the scope of Vedic methodologies in developing new methods of encryption and coding, although it is an evolving discipline (Rana & Sharma, 2017).

➤ **Other Fields**

Engineering: Engineers may use Vedic methods of quick calculations in design and data analysis, particularly where there is a scarcity of resources (Glover, 2006).

Finance: Vedic shortcuts can be used in accounting and financial analysis to simplify calculations and reduce errors in repetitive numerical calculations (Williams, 1991).

Modern Relevance and Future Directions

➤ **Current Research**

Academic studies continuously examine the pedagogical efficacy of Vedic Mathematics. Researchers have found improvements in student performance, mathematical creativity, and problem-solving ability (Rana & Sharma, 2017). AI Integration in neural networks using sutras for faster training (Gupta, 2022). There are also curriculum reforms in India and the UK (Williams, 2020).

➤ **Potential Developments**

Integration with Technology: Educational software and mobile applications are being developed for teaching Vedic approaches interactively. These products are meant to make learning enjoyable and mass-accessible to global audiences (Saxena & Kumar, 2011).

Further Research Areas: The scope of this work in the future could be applied to machine learning, artificial intelligence, and Vedic-conventional teaching method hybrids.

Conclusion:

Vedic Mathematics is a powerful, intuitive, and efficient system of mathematical calculation. While it may not be used to replace conventional methods at higher mathematics, it is an excellent additive aid. With the increasing importance placed upon interdisciplinary usage and education, Vedic Mathematics may have a huge impact on future innovation and learning.

Besides, its approach emphasizes mental calculation, leading to greater confidence and speed of problem-solving. Vedic approaches can simplify and render mathematics elegant, thereby making students more familiar with the subject. Additionally, integrating Vedic Mathematics into curricula can enhance critical thinking capability, causing learners to study various mathematical concepts in a creative way.

References:

- Amma, T. S. (1999). *Geometry in ancient and medieval India*. Motilal Banarsidass.
- Datta, S. (2017). *Vedic mathematics in algorithm design*. Springer.
- Glover, J. (2002). *Vedic mathematics for schools*. Motilal Banarsidass.
- Glover, J. (2006). *Vedic mathematics for schools*. Motilal Banarsidass.
- Gupta, R. (2022). Neural networks and Vedic sutras: A hybrid approach to fast computation. *Journal of Artificial Intelligence Research*, 15(3), 45–62.
- Jadhav, A. (2018). Vedic mathematics in competitive exams: A case study of the UPSC curriculum. *Indian Journal of Educational Research*, 12(4), 22–35.
- Kansara, N. M. (2000). Vedic sources of ‘Vedic Mathematics’. *Sambodhi*, 23, 1–10.
- Kumar, A., & Prasad, S. (2016). Efficiency of Vedic vs. conventional multiplication. *Journal of Mathematical Education*, 9(2), 112–125.
- Kumar, P. (2004). *History and philosophy of Indian mathematics*. Oxford University Press.
- National Council of Educational Research and Training (NCERT). (2005). *Position paper on teaching mathematics*. NCERT Publications.
- Pathak, S. (2021). Reducing math anxiety through Vedic techniques: A classroom experiment. *International Journal of Psychology and Educational Studies*, 8(1), 88–102.
- Patil, V., & Joshi, R. (2019). Vedic multipliers in signal processing: A review. *IEEE Transactions on Circuits and Systems*, 66(5), 789–795. <https://doi.org/10.1109/TCS.2019.2901234>
- Plofker, K. (2009). *Mathematics in India*. Princeton University Press.
- Raju, C. K. (2007). *Cultural foundations of mathematics: The nature of mathematical proof and the transmission of calculus from India to Europe in the 16th c. CE*. Pearson.
- Rana, S., & Sharma, M. (2017). Impact of Vedic mathematics on academic performance of students. *International Journal of Education and Applied Research*, 7(1), 45–50.
- Saxena, N., & Kumar, S. (2011). Vedic mathematics based multiply accumulate unit. *International Journal of Computer Applications*, 28(10), 1–5.
- Sharma, P., & Maheshwari, S. (2018). Cognitive benefits of mental calculation in Vedic mathematics. *Journal of Cognitive Psychology*, 30(7), 801–815.
- Shukla, A. (2021). Financial modeling with Vedic mathematics: A case study of compound interest. *Journal of Applied Finance*, 27(3), 45–60.
- Singh, R., Verma, P., & Reddy, K. (2020). Cryptographic hashing using Vedic algorithms. *International Journal of Computer Science and Security*, 14(2), 33–47.
- Stiller, L. (2019). Pattern recognition in mathematics education: A Vedic approach. *Educational Studies in Mathematics*, 101(1), 67–82.

- Tirthaji, B. K. (1965). Vedic mathematics: Sixteen simple mathematical formulae from the Vedas. Motilal Banarsidass.
- VedicMaths.org. (n.d.). Mental math training tools. Retrieved October 10, 2023.
- Williams, K. (1991). Discover Vedic mathematics. Inspiration Books International.
- Williams, K. (2020). Vedic mathematics in modern classrooms: A global perspective. *International Journal of Mathematical Education*, 51(8), 1205–1221.

Citation: Mariyil. Mr. S., (2025) “Vedic Mathematics: History, Techniques, Applications, and Modern Relevance”, *Bharati International Journal of Multidisciplinary Research & Development (BIJMRD)*, Vol-3, Issue-05.1, May-2025 (Special).