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Vedic Mathematics in Algebra Techniques, and Problem-Solving Benefits

Pramila Mishra[1,*], Kuldeep Mishra[2]

Abstract

The sixteen Sutras and thirteen Sub-Sutras form the foundation of Vedic algebraic mathematics. This article discusses the Buddha's teachings and shows how to use them to solve algebra problems. Unified mathematics is defined as a state where processes can refer to and understand each other. Vedic formulas, which can be utilized for addition, subtraction, division, and other mathematical operations, are taught with examples. Vedic mathematics not only saves time, but also helps us make quick decisions and understand complex problems. Vedic mathematics helps reduce the burden of poor academic performance. Simple mathematics is a common description of Vedic mathematics. But it also gives good techniques for solving mathematical problems. Beyond its utility in arithmetic and algebra, Vedic mathematics is also appreciated for its intuitive and pattern-based approach. The system encourages mental calculation and logical reasoning, promoting a deeper understanding of mathematical concepts instead of relying solely on rote memorization or repetitive methods. For instance, the Sutra "Vertically and Crosswise" enables the multiplication of large numbers with remarkable speed and accuracy. Similarly, techniques such as "All from 9 and the Last from 10" simplify complex subtraction problems within seconds. Students and educators alike have found these methods particularly helpful in exam preparation and competitive test scenarios. Vedic math is also used as a brain development tool for young learners, helping to build confidence and enhance concentration. The clarity and elegance of the system appeal to people from various educational backgrounds, making math more accessible and less intimidating. Additionally, it bridges gaps between traditional learning and modern education, preserving ancient wisdom while addressing contemporary academic challenges. As a result, Vedic mathematics is gaining global recognition for its effectiveness and versatility.

Keywords: Vedic mathematics, the Vedas, sacred texts, equations, algebra

INTRODUCTION

The word "knowledge" is the most widely used definition of Veda. The word "veda" means "knowledge" in Sanskrit. The Vedas are regarded as the oldest written manuscripts in the world and are the most revered texts in India. The "Miraculous Formula Veda" is another name for the Atharva Veda. Vedic mathematics is considered an ancient system that helps develop counting skills. However, by using the general and special methods of Vedic mathematics, mathematical calculations can be solved quickly and accurately. Vedic Mathematical Techniques/Sutras contain mathematical techniques that are used to perform rapid calculations to solve problems such as intelligence or reasoning problems. These verses and their brief content are listed below [1-3].

1. *Ekadhikina Purvena:* Increase a number by adding it to the preceding one.
2. *Nikhilam Navatashcaramam Dasatah:* Add all the numbers in base 9 and get the final number in base 10.
3. *Urdhva-tiryagbhyam:* Vertical and diagonal.
4. *ParavartyaYojayet:* Change and alteration.

***Author for Correspondence**
Pramila Mishra
E-mail: kdmishra2004@gmail.com

[1]Department of Mathematics, UIT Barkatullah University, Bhopal, Madhya Pradesh, India
[2]Professor, Department of Civil Engineering, Bagulamukhi College of Technology, Bhopal, Madhya Pradesh, India

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5. The Sunyam-Samyasamuccaye statement is, "When the sums are the same, the sum is zero."
6. *(Anurupye) Sunyamanyat:* When one quantity is in proportion, the other becomes zero
7. *Sankalana-vyavakalanabhyam:* By increasing and decreasing.
8. *Puranapuranabyham:* Complete or incomplete.
9. *Calana-Kalanabhyam:* Difference and similarity.
10. *Yaavadunam:* Whatever the degree of their imperfections.
11. *Vyashtisamastih:* Division and addition.
12. *SesanyankenaCaramena:* Remainder of the last number.
13. *Sopantyadvayamantyam:* Final result and two benefits.
14. *Keyonna Purvena:* Reduce a number by subtracting it from its predecessor
15. *Gunitasamuccayah:* The total product equals the sum of individual products."
16. *Gunakasamuccayah:* "The elements of income are equal to the benefits provided by their conditions."

The thirteen sub-sutras and their brief contents are as follows:

1. *Anurupyena:* Equal.
2. *SisyateSesasamjnah:* "The rest remains unchanged."
3. *Adyamadyenantya-mantyena:* "The first comes from the first, the last comes from the last."
4. *KevalaihSaptakamGunyat:* "The product of 7 is 143".
5. *Vestanam:* "By contact".
6. *YavadunamTavadunam:* Decrease due to lack of capacity.
7. *YavadunamTavadunikrityaVargancaYojayet:* "Whatever the number of defects, it should be divided by four times the number of defects".
8. *Antyayordasake'pi:* Refers to any number ending in 10.
9. *Antyayoreva:* mostly the last.
10. *Samuccayagunitah:* "The sum of the coefficients of a product."
11. *Lopanasthapanabhyam:* Removal and preservation from change.
12. *Vilokanam:* By simple analysis.
13. *Gunitasamuccayah Samuccaye Gunitah:* The sum's product matches the total of individual products [4-5].

Vedic mathematical formulas are based on modern mathematics and ancient numbers. Eachpattern is described as a very simple concept and strategy that can be used to find the problem of change [6].

LITERATURE REVIEW

Students face many problems while solving quick calculations even if they know how to solve the problem. Mostly when we solve mathematical problems like cube root, arithmetic, multiplication, addition, subtraction of ten, division, square root in the competition, we can solve these problems with or without Vedic Mathematics solution tips in this article. Usually we spend a lot of time to solve mathematics but when we use Vedic mathematics we can solve it easily. To put it succinctly, we can use Vedic mathematics' tools to solve mathematical problems time. It is hoped that this article will play a good role in research and methods to increase the calculation speed of advanced tests [7-8].

That Vedic mathematics is based on a total of 16scriptures, both in terms of purpose and content. These are the purposes that can be used to solve our daily problems and the content that the scriptures

believe is based on the functioning [9-10].

which can be converted into a new field of study using deep learning, speeds up computations in high school mathematics [11].

That applying Vedic mathematical ideas to problems can save time. He found that Vedic mathematics reduces our workload such as multitasking, problem solving and calculation. There are numerous simple methods available for calculations [12].

T**he** analyzed ancient Indian numbers and examined them as Vedic mathematics. When we use Vedic mathematics in competitive exams and higher education, we will solve simple questions that will increase interest and reduce time. We can swiftly, precisely, and efficiently address our difficulties with the aid of the Vedas. Various problems faced by students while using Vedic Mathematics will be identified and corrected [13].

A study which showed that by using Vedic Mathematics techniques we can reduce the work and save time. We can use these mathematical skills like reasoning and finding good questions in competitive exams. We can learn many ways to solve large numbers using Vedic Mathematics [14].

Poonam Bajpai [2019] conducted a study in and statistically shown in this paper how effective Vedic mathematics techniques are in solving simple mathematical problems for competitive exams. Increased usage of Vedic mathematics develops an unquestionable interest in numbers, enhances mental health, increases intelligence and brain strength, and evolves the brain by improving its capacity for resolution and attentiveness. One can become proficient at solving tedious and uncomfortable mathematical operations in a simple manner and lessen their phobia of arithmetic by consistently practicing Vedic mathematics approaches. The significance of Vedic mathematics is covered in this article. Vedic Mathematics is a basic form of Mathematics, but it is useful for the expansion of mathematics. Numerous scientists assess mathematical techniques and do study using Vedic mathematical instruments. Vedic Mathematics is a traditional Indian arithmetic system introduced in 1957, comprising 16 sutras and 13 sub-sutras.

In higher level exams, students can find solutions to questions in a short time using Vedic mathematics.

To apply Vedic Mathematics methods to address various issues efficiently within a limited period. By employing Vedic Mathematics, one can proficiently tackle a diverse array of problems in the most effective way [15-17].

That mathematical operations such as multiplication, division, addition, and subtraction can be effectively addressed using 16 sutras derived from Vedic mathematics. This paper explores the importance of Vedic mathematics, which serves as a foundational approach to mathematics while also enhancing the understanding of various mathematical operations. Many researchers integrate Vedic mathematics techniques into their studies to analyse mathematical processes. The ancient Indian system of Vedic Mathematics, consisting of 16 sutras and 13 sub-sutras, was introduced in 1957. Students preparing for advanced examinations can efficiently solve problems by utilizing Vedic mathematics.

Parajuli studied ancient Sanskrit literature and revived Vedic mathematics. He found that there are five unique and remarkable patterns in Vedic mathematics. Even beginners can easily and quickly solve math problems using these math functions. We use calculators to solve problems using ancient math formulas, but when we solve problems using Vedic mathematics, we can solve equations in our minds [18, 19].

Multiplication

Vedic Mathematics encompasses specific multiplication sutras and sub-sutras designed to simplify and enhance the process of solving multiplication problems. These methods include Anurupyena, Ekanyunena Purvena, Urdhva Tiryagbhyam, Antyayor Dasakepi, Nikhilam Navatashcaramam Dasatah, Gunita Samuccayah, and Yavadunam Tavadunikritya Varganca Yojayet. By applying these formulas, we can approach certain multiplication equations in a unique manner [20].

Antyayordasakaepi

"Last totaling 10" is a corollary indicating that the sum of the last digits of two numbers equals 10.

Pairs like 35 and 35, 124 and 26, 72 and 78, and 23 and 27 are a few examples that demonstrate this idea. In each instance, 10 is obtained by adding the final digit of the first number to the final digit of the second number. Furthermore, we will use the leftmost digits of both integers directly because they are identical. We get the right answer by multiplying the final digits together.

i. *Multiply 395 by 395:* Here firstly we apply Ekhadhikena on the left side multiplication is (39 + 1) × 39 = 40 × 39 = 1560. And in the right side is 5× 5 = 25
   And the final answer is 156025.
ii. *To multiply 127×123:* As Antyayordasakepi works, we apply Ekadhikena
   127× 123 = 12×13 / 7× 3
   = 156 / 21
   = 15621
iii. To multiply 693× 697
   693× 697 = 69× 70 / 3 ×7
   = 4830 / 21
   = 483021
iv. *To multiply 848 × 852:* Add 48 and 52, 48 + 52 =100, we will appliedEkadhikena sutra in the left side multiplication, and we applied directly Anurupyena sub-sutra in the right side multiplication.
   48 - 2
   52 + 2
   50÷ 2 / -2 × 2
   25 / - 4
   24 / (100- 4)
   24 / 96
   2496
   And write 848 × 852 = 8× 9 / 48 × 52
   720 / 2496 722496
   [Here the left side multiplication is taking base 10 and 1 be carry over as the base is 100]

Yavadunam Tavadunikritya Varganca Yojayet

Using this formula simply means "reduce the deficiency by that amount and then calculate the square of the deficiency." This sub-sutra is utilized when determining the square of numbers that are near a power of 10.

1. Squaring Numbers Close to Powers of 10 (Less than the Base)
   For example, to find the square of 994:
   - The base is 1000, and the deficit is calculated as 1000 - 994 = 6.
   - Squaring 6 gives 36.
   - Subtracting the deficiency from 994: 994 - 6 = 988.
   - The final result is written as 988 / 036, giving 988036. [Here, the base used is 10000.]
2. Squaring Numbers Greater than a Power of 10
   For example, to find the square of 10025:

- The base is 10000.
- The excess is calculated as 10025 - 10000 = 25.
- Squaring 25 gives 625.
- Adding the excess to 10025: 10025 + 25 = 10050.
- The final result is written as 10050 / 0625, resulting in 100500625. [Here, the base used is 10000.]

3. Squaring Numbers Near Multiples of 10, 100, 1000, etc.
   This method combines the corollaries 'Anurupyena' and 'Yavadunam Tavadunikritya Varganca Yojayet' for numbers close to such multipliers.
   For example, to find the square of 388:
   Here the nearest base is 400,
   Here 400 behave like as 4×100. And the number 388 is less than the base 400.
   Subtract the number 388 from the base i.e. 400 – 388 = 12
   Again subtract 12 from the number 388, i.e. 388 – 12 = 376
   Now multiply 376 by 4, because the base is 4 ×100 = 400.
   376 ×4 = 1504
   Square of 12 i.e. $12^2 = 144$.
   And the result is 1504 / 144 = 150544 [since the base is 400 and it is multiple of 100]
   Another example: find the square of 5012
   Here the nearest lower base is 5000 = 5× 1000
   Subtract the 5000 from 5012, that is 5012-5000 = 12
   Square of 12 is: $12^2 = 144$
   Add 12 to number 5012 that is 5012 + 12 = 5024
   Multiply 5024 by 5, because the base is 5 × 1000 = 5000
   5024 × 5 = 25120
   Hence the answer is 25120 / 144 = 25120144

Nikhilam Navatascharam Dasatah

This formula can be succinctly described as encompassing all values from 9 up to 10. It proves to be highly effective for multiplying numbers that are based on a closed system, such as 10, 100, or 1000. By utilizing this formula, we can efficiently tackle multiplication problems, even performing them mentally. It is relevant for multiplicands that are either below or above the base value.

When performing the multiplication, if the number is less than the base, we will denote it with a negative sign, which should be explicitly stated. Conversely, if the number exceeds the base, it will be considered positive, and there is no need to indicate the positive sign.

107 + 7 Here the base is 10 17 + 7
106 + 6 12 + 2
107+6 or 106+7 / 6×7 17+2 or 12+7 / 7×2
113 / 42 19 / 14
So, result is 11342 so, result is 204

DISCUSSION

This formula can be succinctly described as encompassing all values from 9 up to 10. It proves to be highly effective for multiplying numbers that are based on a closed system, such as 10, 100, 1000, etc. By utilizing this formula, we can efficiently tackle multiplication problems, even performing them mentally. It is relevant for multiplicands that are either below or above the base value.

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CONCLUSION

In this essay, we conclude that understanding the core principles of Vedic Mathematics is crucial. This study will benefit curriculum designers by guiding essential changes that enable instructors to effectively teach Vedic Mathematics. The paper provides statistical evidence demonstrating the significant effectiveness of Vedic Mathematics techniques in solving basic mathematical problems for competitive examinations. Additionally, it offers a comprehensive survey of Vedic Mathematics. While Vedic Mathematics is a straightforward approach, it encompasses important sutras that facilitate computations. This unique method relies on simple assumptions and directives, allowing for oral solutions to various mathematical challenges.

REFERENCES

1. Cuemath. Addition and Subtraction Tricks [Internet]. Available from: https://www.cuemath.com
2. Bajpai P. Effectiveness of Vedic Mathematics in Present Scenario. 2019. Print ISSN: 2394–0344, Electronic ISSN: 2455–0817. RNI No: UPBIL/2016/67980.
3. Devi S. Applications of Vedic Mathematics in Algebra. Int Res J Adv Sci Hub. 2020; e-ISSN: 2582–4376.
4. Karani KP. [No title]. 2017 Apr. ISSN: 2249–0558.
5. Kaur G. Vedic Mathematics: Improving Speed of Basic Mathematics. JETIR. 2017 Dec; ISSN: 2349–5162.
6. Koch LA. [No title]. Scholarly Research Journal. 2017;(45269). Licensed based on a work.
7. Mathematics IV. Supplement to chapter 8. Mathematics IV. p. 20–31.
8. Dhanave MN, Kangale MA. The Implementation of Vedic Mathematics to Algebra and Geometry. IOSR J Math. 2014; e-ISSN: 2278–5728, p-ISSN: 2319–765X.
9. [No author]. Of A. Fundamental and Vedic Mathematics. [No date].
10. Parajulik. Elementary Algebra on Vedic Mathematics. 2021; ISSN: 2645–8500.
11. Rani U. Vedic Mathematics – A controversial origin but a wonderful discovery. 2014; ISSN: 2249–555X.
12. Parsad KK. An Empirical Study on Role of Vedic Mathematics in Improving the Speed of Basic Mathematical Operations. 2016; ISSN: 2249–0558.
13. Sapnabajantri. Division Made Easier by Vedic Mathematics. 2017.
14. Shukla AK, Shukla RP, Singh AP. A Comparative Study of Effectiveness of Teaching Mathematics through Conventional & Vedic Mathematics Approach. Educ Quest. 2017;8(3):431.
15. Solanki V. A Review Paper on Vedic Mathematics. Int J Innov Res Eng Manag. 2021; ISSN: 2350–0557.
16. Ziyyara. Sutra Formulas of Vedic Mathematics [Internet]. Available from: https://ziyyara.com
17. Vedic Mathematics Secret.com [Internet]. Available from: https://vedicmathematicssecret.com
18. Vedantu. Vedic Maths Tricks: Calculate 10x Faster [Internet]. Available from: https://www.vedantu.com
19. Tiwari Academy. Vedic Maths Tricks [Internet]. Available from: https://www.tiwariacademy.com
20. Wikipedia. Vedas [Internet]. Available from: https://en.wikipedia.org/wiki/Vedas

