A Review Paper on Vedic Mathematics

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ABSTRACT

Vedic mathematics is an ancient Indian mathematical system, or a set of precise rules, that may be applied to any trigonometric, algebraic, arithmetic, or geometric problem. The technique is based on 16 Vedic sutras, which are a collection of word equations that explain the steps or reasoning involved in solving a variety of mathematical problems that are difficult and time consuming to answer using traditional methods. Beginning with the foundations of Vedic mathematics, such as the meaning of Vedic mathematics, this article examines mathematical operations using Vedic mathematics. The Vedas mathematics formulae are then presented with the aid of many examples, and may be utilized to execute a variety of mathematical operations like as subtraction, addition, division, and multiplication, among others. Vedic math is a basic mathematics, but it is a better method to do mathematics. It has a bright future ahead of it, and it will aid in learning mathematics in depth with clear explanations. Because it is now taught in all high schools and colleges.

Keywords

Digit, Formula, Mathematics, Operation, Veda.

1. INTRODUCTION

The most common definition of Veda is "knowledge". It is both the earliest layer of Ancient Indian culture and the oldest texts of Hinduism. The Vedas are regarded divine in origin and are believed to be divine revelations from God. The four Vedas are the Yajur-veda, Rig-Veda, Athar-vaveda, and Samaveda. The Vedas are ancient texts with an uncertain precise date, although they are believed to date from the early centuries B.C. The content of the Vedas was well-known long before printing was invented, and it was freely available to everyone. This was passed down down the centuries through word of mouth [1]. The Vedas are a collection of texts that have recently been found to be highly organized both internally and in their relationships with one another. Krishna spend 8 years in the Shringari pine forest Shringari Moth practicing Brahma Sadhana and learning advanced Vedanta Theory between 1911 and 1918. According to him, one of the results of his dedication was the discovery and reconstruction of Vedic from stray allusions inside the Atharvaveda's appendix sections[2]. As illustrated in Figure 1, Vedic Mathematics is a logic and math system based on sixteen formulae and thirteen sub formulas with a basic idea and rule. The Vedic mathematical processes are based on both contemporary and ancient mathematical systems. Each formula describes a mental working concept that may be used to solve a variety of mathematical problems[3].
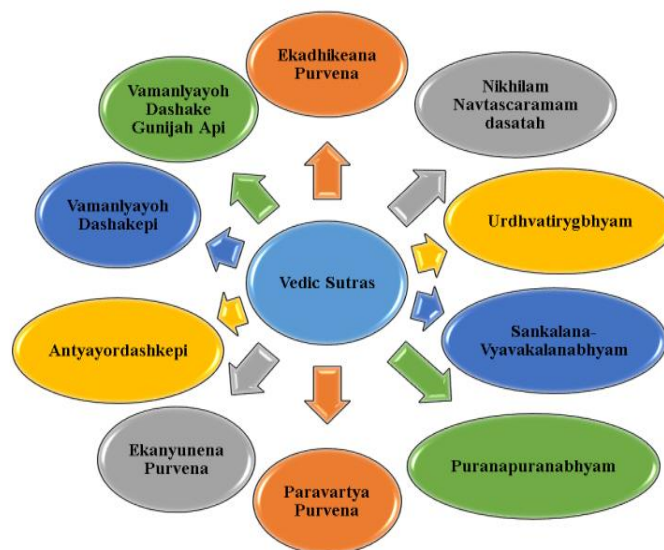

Figure 1: The Sixteen Formulas and Thirteen Sub Formulas with the Simple Rules and Concepts
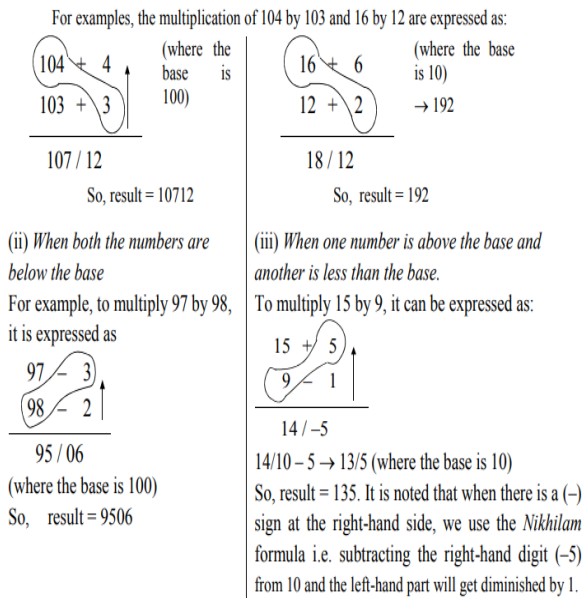
1.1 Addition

The addition formulae used in Vedic Mathematics include SankalanaVyavakalanabhyam, EkadhikeanaPurvena, and Puranapuranabhyam. The following stages may be used to break down the whole process of adding [4]:

$$
\begin{array}{r}
9'\ 8'\ 7 \\
4\ 6'\ 6' \\
8'\ 4\ 7' \\
+\ 2\ 4\ 8 \\
\hline
2\ 5\ 4\ 8
\end{array}
$$

Figure 2: An Example of the Addition Operator Which is done by with the help of Vedas Formula

Column by column, add the digits, and when the total exceeds 10, mark it with a tick or a dot. Continue with the remainder of the ten and add it to the next digit in the column. Finally, add up the number of ticks or dots and put the total in the following fields. Figure 2 depicts an example of addition.

1.2 Subtraction

The Vedic recipe for success 'All from the 9 and last from the 10' is the meaning of the NikhilamNavatascaramamdasatah for the subtraction operation. When subtracting from a multiple of ten, such as 10, 100, 1000, or 10000, traditional techniques need numerous carry overs, which wastes time and creates doubt about accuracy, while Vedic approaches assist in this area while also saving time. The following examples, asshown in Figure 3, may be used to demonstrate the subjects [5].

- Move from right to left as soon as possible. Replace the last 0 with 10 and each of the left-hand zeroes with 9. The extreme left s digit will be reduced by one before zero[6].
- Take, for example, eliminating 5472 from a total of 400000.

$$
\begin{array}{ccc}
400000 & & 399910 \\
-5472 & \text{will become} & -5472 \\
\hline
& & 394528
\end{array}
$$

Figure 3: An Example of the Subtraction Operator Which is done by with the help of Vedas Formula

- When the digits at the minuend (upper digit) > the Subtrahend digits, normal subtraction is done (lowers digit).
- Take the difference's complements if the top digits are more than the lower digits (that is complemented of 0 is 10). The complement of 1 is 9, the complement of 2 is 8, and so on. The complement of the last digit is selected from the 10, while the complements of the other digits are chosen from the 9.
- When we've gotten to the point where we don't need to take the complement, we remove 1 from the column[7].

1.3 Multiplication

Anurupyena Antyayoshatakepi, Nikhilams Navatascharam Dasatahs, Antyayordashkepi, Ekanyunena Purvenas, Vamanlyayohs Dashakepi, Vamanlyayohs Dashakepi, Vamanlyayohs Dashakepi, Vamanlyayohs Dashakepi, Vamanlyayohs Dashake Urdhvatiryagbhyam and Gunijahs Api are two Vedic multiplication formulae.With the exception of Urdhvatiryagbhyam, which has a restricted use, all of the formulae are particular multiplication formulas. Many specific equations may assist us in quickly determining the solution to a certain kind of multiplication, and the Urdhvatiryagbhyam method can assist us with any type of multiplication. Here are some instances of special formulas:

1.3.1 Antyayotdashakepi

This formula is only valid if the multiplier's and multiplicands total unit digits are 10 and the rest of the digits are the same. RHS and LHS will be the two parts of the final goods.Multiply the unit digit by two and put the result in the RHS area (right hand side). In the LHS (Left Hand Side) section, write the products of (Remaining digit at hundreds or tens place) and (Remaining digits at hundreds / tens place add 1).To multiply 75 by the 75, for example, RHS = $5 \times 5 = 25$ and LHS = $(7 + 1)\ 7$ Equals 72. As a results, the outcome is 7225.

1.3.2 Vamanlyayoh Dashakepi

This formula applies when the total of the digits in the tens places in the multiplier and multiplicand is 10 and the unit digits of both multiplier and multiplicand are the same. The process for obtaining more information. The answer to such questions consists of two parts.

LHS = Products ofthe left digits whose sum is 10 + unit digit; and RHS = Square of the unit digit. For example, to multiply 98 by 18, LHS = $9 \times 1 + 8 = 17$ and RHS = $8 \times 8 = 64$. The result = 1764.

1.3.3 Nikhilam Navatascharam Dasatah

When the multiplier and multiplicand are close to the base, this approach works well. The bases should be in $10n$ shapes, with n being the natural number. The following is a step-by-step explanation of the concept. Write the two numbers one below the other, together with their deviations from the base. There are two parts to this.

- A diagonal cross operation of the two numbers will provide the left-hands component.
- The right side of the solution may be obtained by multiplying the deviations [8].

The numbers in the right-hand side of the digits will correspond to the number of zeroes in the base number. As illustrated in Figure 3, this approach may be used to a variety of scenarios. When both numbers are larger than zero, the following is true:

For examples, the multiplication of 104 by 103 and 16 by 12 are expressed as:

104 + 4 (where the base is 100)
103 + 3

107 / 12

So, result = 10712

16 + 6 (where the base is 10)
12 + 2 → 192

18 / 12

So, result = 192

(ii) *When both the numbers are below the base*

For example, to multiply 97 by 98, it is expressed as

97 – 3
98 – 2

95 / 06

(where the base is 100)

So, result = 9506

(iii) *When one number is above the base and another is less than the base.*

To multiply 15 by 9, it can be expressed as:

15 + 5
9 – 1

14 / –5

$14/10 – 5 \rightarrow 13/5$ (where the base is 10)

So, result = 135. It is noted that when there is a (–) sign at the right-hand side, we use the *Nikhilam* formula i.e. subtracting the right-hand digit (–5) from 10 and the left-hand part will get diminished by 1.

Figure 3: An Example of the Multiplication Operator Which is done by with the help of Vedas Formula

1.3.4 Ekanyunena Purvena

The meaning of the formula is "by one less than the previous one." This formula is used when the multiplier is 9, 99, 999, or 9999. The methodology may be divided into two types [9].

- When the multiplicand's digit numbers are equal to or less than the nines' numbers: The steps are as follows: Subtract 1 from the multiplicand and put the result in the LHS; next, subtract the multiplicand using the Nikhilam formula and record the results in the RHS.
- To multiply 3784 by 999999, for example, use LHS = 3784 – 1 =3783, RHS = 999999 – 3783 = 996213, and Results = 3784996214.
- When the multiplicand's digit numbers are more than the nines: It's a little different than you're accustomed to.
- Multiply the multiplicand by as many zeros as the number of nines to get the answer.
- Subtract the original multiplicands from the figure from the first step.

2. LITERATURE REVIEW

Students are unable to speed up the calculation process even if they understand the issue. A group of twenty-five competitive examination writing students are given some basic mathematical calculations, such as multiplication, square root, cube root, and subtraction of fractional decimal numbers, and told to solve questions without and with the use of Vedic methods techniques in their paper. The time it takes to perform the calculations before and after utilizing Vedic methods approaches is measured in minutes and a paired t test is used to compare the results. Their study showed that while doing basic mathematical operations, employing the Vedic method significantly speeds up computations. Wishing that their article would be useful and active in real Vedic mathematics research and methods for increasing computing speed, especially in competitive examinations[10].Krishna Kanta Parajuliet al. studied ancient

Sanskrit literature and recreated Vedic Mathematics. Vedic Mathematics is based on Veda and was popularized between 1911 and 1918 in the early twentieth century. It is a mathematical system that is very independent, efficient, and complex, and is based on their sixteen equations as well as many sub formula with basic principles and regulations. Their paper's main goal is to convey new mathematical methods that provide straightforward, modest, mental, and one-line solutions to mathematical problems. Basic mathematical operations like as subtraction, addition, division, and multiplication may be done quickly and verified using Vedic principles, and the results can be obtained and checked in under a minute. For each issue, this approach typically has one general method and many specific pattern problems. Their article is exclusively focused on the unique pattern of Vedic Mathematics' basic operations [11].Between 1911 and 1918, Indian mathematician Jagadguru Shri Bharathi Krishna Tirtha developed Vedic Mathematics, according to Archana V Katgeri. Tirthaji Maharaj, also known as BharatiKrsna, subsequently published his findings in a Vedic Mathematics book. BharatiKrsna was a Lord Krsna devotee who lived from 1884 until 1960. He was a brilliant student who excelled in all of his subjects, including Mathematics, Sanskrit, English, Philosophy, Science, and History. After hearing what the European scholars had to say regarding the sections of the Vedas that were thought to contain mathematics, he resolved to study the papers and find out what they had to say. Between 1911 and 1918, he was able to reconstruct the ancient mathematical systems known as Vedic Mathematic. Vedic Mathematic is a collection of methods for solving mathematical problems fast and simply. It consists of sixteen Sutras and thirteen Sub-Sutras that may be used to solve problems in algebra, conics, arithmetic, geometry, and calculus. Vedic Mathematics is a mental mathematics methodology. There are many Vedic methods that are interwoven. For example, division may be conceived of as a simple reverse of multiplication. This is in direct opposition to the current system. Solving issues with traditional mathematical methods may be difficult and time-consuming at times. Vedic Mathematics' General and Specific Techniques may be used to do numerical computations fast and correctly [12].

Ajai Kumar Shukla and colleagues investigate ancient Indian mathematical systems known as Vedic mathematics, which were discovered in the early twentieth century from the Atharvaveda, an old Indian book. The purpose of the reading was to evaluate the efficacy of teaching mathematics using both conventional and Vedic methods in terms of student performance in mathematics. This experimental study used a pretest posttest equivalent control group's design, with each group consisting of a randomly chosen sample of thirty students from BKT College. The study focused at the main subjects taught in the Uttar Pradesh Basic Education Board's eighth-grade math curriculum, such as square, square root, factorization of algebraic expressions, and simultaneous humble equations. The mean, standard deviations, t test, and effect sizes were used to analyze the data collected by a self-made Achievement Test in Mathematic (ATM) as a posttest and pretest. The experimental group's arithmetic performance was much greater than the control groups on the posttest. In both collections, there was no significant difference between female and male students on the posttest [13].

3. DISCUSSION

This article examines mathematical operations utilizing Vedic mathematics, beginning with the fundamentals of Vedas mathematics, such as the meaning of Vedas mathematics (Veda's most common definition is "knowledge"). It is both the earliest layer of Ancient Indian culture and the oldest texts of Hinduism. The Vedas are regarded divine in origin and are believed to be divine revelations from God. The four Vedas are the Yajurveda, Rig-Veda, Atharvaveda, and Samaveda). Then there are the Vedic mathematics formulae (Vedic mathematics is a logic and math system based on sixteen formulas and thirteen sub formulas based on basic ideas and rules). Vedic mathematical methods are based on both contemporary and ancient mathematical systems. Each formula describes a mental working concept that may be used to solve a variety of mathematical problems.) Furthermore, this review article discusses the numerous operations in Vedas mathematics, such as addition, subtraction, multiplication, and so on, which are applied using Vedas formulae and examples.

4. CONCLUSION

This paper concludes that Vedic mathematics is very important for a thorough understanding of mathematics. It consists of various Vedas derived from Indian agriculture, and these Vedas assist in performing various types of mathematical operations such as subtraction, addition, division, and multiplication, among others, by providing the various 16 formulae written in Vedas mathematics. This paper provides an overview on the Vedic mathematics. Vedic math is a basic kind of mathematics, but it is a more intelligent method of doing it. It has a bright future ahead of it, and it will help students study mathematics more thoroughly with clear explanations. There are a number of researchers who use Vedic mathematics to study and evaluate mathematical processes. Vedic Mathematics is an old Indian technique of mathematical calculations or processes that was created in 1957 and consists of sixteen word formulas and several sub-formulae. In competitive exams with little or no time, students find it difficult to answer aptitude questions quickly.

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