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"VEDIC MATHEMATICS: A BRIEF OVERVIEW"

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ABSTRACT

This research paper tries to go through the Vedic mathematics system to understand its process. Mathematical operations of Vedic mathematics are quite simple and easy to comprehend and apply. These mathematical operations are based on some sutras and once you understand its system you find the difference in speed of your calculation work. Its very interesting and useful system based on Indian mathematics system.

Keyword: Vedic Mathematics, Sutras, Mathematical operations.

I. INTRODUCTION

Mathematics is a fundamental part of human thought and logic, and integral to attempts at understanding the world and ourselves. Mathematics provides an effective way of building mental discipline and encourages logical reasoning and mental rigor. In addition, mathematical knowledge plays a crucial role in understanding the contents of other school subjects such as science, social studies, and even music and art.

Mathematical literacy is a crucial attribute of individuals living more effective lives as constructive, concerned and reflective citizens. Mathematical literacy is taken to include basic computational skills, quantitative reasoning, spatial ability etc.

Mathematics is applied in various fields and disciplines, i.e., mathematical concepts and procedures are used to solve problems in science, engineering, economics. (For example, the understanding of complex numbers is a prerequisite to learn many concepts in electronics.) The complexity of those problems often requires relatively sophisticated mathematical concepts and procedures when compared to the mathematical literacy aforementioned.

The origin of the word "mathematics" is in Greek, which means tendencies to learn, and there are many branches of mathematics in science, that are related to numbers, including geometric forms, algebra, and others.

II. VEDIC MATHEMATICS

Vedic mathematics is the name given to the ancient Indian system of mathematics that was rediscovered in the early twentieth century from ancient Indian scripture namely Atharvaveda. We use mathematics in our all endeavors; therefore it becomes a part of our life. Our imaginations do involve mathematics. From beggar to businessman, everyone uses mathematics in their life. The education commission (1964-1966) recommended mathematics as a compulsory subject for students at all school level. The National Policy on Education (1986) has also considered the importance of mathematics in general education and suggests that mathematics should be visualized as the vehicle to

train a child to think, reason, analysis and articulate logically apart from being a specific subject. But due to lack of understanding its essence and technique of teaching, mathematics is now considered as a dry subject by many learners. Now a learner shows no interest in learning mathematics, teacher is teaching and students are learning just for the sake of obtaining marks. Most of the problems in Mathematics have magic and mysteries. Our ancient scholars understood all these mysteries and developed some simple ways and techniques to solve mathematical problems. One such technique is Vedic mathematics as it helps to solve mathematical problems very much faster than the traditional methods of solving problems. The National Policy of Education (NPE-1986) stated "Mathematics could be considered as a medium to train a child to develop his thinking capacity, to develop his reasoning power, and to coherent logically". So mathematics should be shown as a way of thinking, an art or form of beauty, and as human achievement and it can be achieved easily through Vedic mathematics as it not only helps in generating interest and concept clarity in students but also stabilizing the knowledge for longer duration too.

Mathematics is the study of numbers, quantity, space, structure and change. It is a branch of science that uses numbers and symbols which are arranged using systematic mathematics rules. It can create moment of pleasure and wonder for all pupils when they solve a problem for the first time, discover a more efficient solution, or notice hidden connection. But the essence and nature of teaching of mathematics is degrading day by day which creates a fear and phobia among students. Due to excessive use of electronic gadgets and internet software, student and teacher both are diverting their path from efficient and effective teaching learning process. Now a student is laying less stress on mental calculation and is more dependent on the gadgets and software for the solution. Vedic mathematics is a unique method of solving problems by the use of fast calculations. It is unique system as it helps to solve all kinds of mathematical problems easily and efficiently. Tiwari, Gankhuyag, Kim & Cho (2008) found that the proposed Vedic multiplier circuit seems to have better performance in terms of speed. The goal of teaching mathematics is not just academic achievement but its personal and professional growth also. Vedic mathematics not only helps in understanding the concept efficiently but also brings interest while learning mathematics through magical techniques.

Atharvaveda – supposedly contains a set of sixteen sutras that describe all of mathematics. Sutra is often translated word formula and is short and easily memorized and recited. Vedic Mathematics is a system of mathematics based on these sixteen sutras. These sixteen sutras are given below.

III. THE 16 SUTRAS OF VEDIC MATH

1. *Ekadhikina Purvena*
   (Corollary: Anurupyena)
   Meaning: By one more than the previous one
2. *Nikhilam Navatashcaramam Dashatah*
   (Corollary: Sisyate Sesasamjnah)
   Meaning: All from 9 and the last from 10
3. *Urdhva-Tiryagbyham*
   (Corollary: Adyamadyenantyamantyena)
   Meaning: Vertically and crosswise
4. *Paraavartya Yojayet*
   (Corollary: Kevalaih Saptakam Gunyat)
   Meaning: Transpose and adjust
5. *Shunyam Saamyasamuccaye*
   (Corollary: Vestanam)
   Meaning: When the sum is the same that sum is zero
6. *(Anurupye) Shunyamanyat*
   (Corollary: Yavadunam Tavadunam)
   Meaning: If one is in ratio, the other is zero

7. *Sankalana-vyavakalanabhyam*
   (Corollary: Yavadunam Tavadunikritya Varga Yojayet)
   Meaning: By addition and by subtraction

8. *Puranapuranabyham*
   (Corollary: Antyayordashake'pi)
   Meaning: By the completion or non-completion

9. *Chalana-Kalanabyham*
   (Corollary: Antyayoreva)
   Meaning: Differences and Similarities

10. *Yaavadunam*
    (Corollary: Samuccayagunitah)
    Meaning: Whatever the extent of its deficiency

11. *Vyashtisamanstih*
    (Corollary: Lopanasthapanabhyam)
    Meaning: Part and Whole

12. *Shesanyankena Charamena*
    (Corollary: Vilokanam)
    Meaning: The remainders by the last digit

13. *Sopaantyadvayamantyam*
    (Corollary: Gunitasamuccayah Samuccayagunitah)
    Meaning: The ultimate and twice the penultimate

14. *Ekanyunena Purvena*
    (Corollary: Dhvajanka)
    Meaning: By one less than the previous one

15. *Gunitasamuchyah*
    (Corollary: Dwandwa Yoga)
    Meaning: The product of the sum is equal to the sum of the product

16. *Gunakasamuchyah*
    (Corollary: Adyam Antyam Madhyam)
    Meaning: The factors of the sum is equal to the sum of the factors

Here is an example to show how fast the results can be achieved using Vedic mathematical operations-

Example-1:

Present/ Conventional System: Find 109^2 =

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        1 0 9
      x 1 0 9
      ─────────
        9 8 1
      0 0 0 x
    1 0 9 x x
    ─────────
    1 1 8 8 1
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Vedic Mathematical Operation:
Find 109^2 =   (109+9)/9x9   =   (118)/81   = 11881

First step: 109 is added by 9 and 118 is put as one part of the answer.
Second step: 9 is multiplied by 9, other part of the answer comes as 81. The product thus comes 11881.

This calculation is based on *Nikhilam Sutra (Corollary)* which means "whatever the extent of its deficiency, lessen it still further to that very extent, and also set up the square (of that deficiency)".

But for numbers above 10 We work exactly as before; but, instead of reducing still further by the deficit, we increase the number still further by the surplus. In above example 9 is surplus from 100 then 9 is added to 109 and becomes 118.

After that that surplus 9 is squared and becomes 81. Putting 81 after 118 we get the answer 11881 which is the square of 109.

17. Thus from above example it can be observed very easily that vedic mathematical operations are much easier than the present system of mathematical operations. This system speeds up your calculation ability and thus reducing the time taken to solve the mathematical problems. Researches are showing that application of Vedic Mathematical operations is increasing in every field of mathematics.

IV. STUDIES SUPPORTING VEDIC MATHEMATICAL OPERATIONS BETTER THAN PRESENT MATHEMATICAL OPERATIONS

Babajee, Dr D. K. R. (2015), studied the various applications of Vedic Mathematics and found that the excess of the sum of the smaller sides of a right angled triangle over the hypotenuse is always even and using this property he derived the old two-fraction method for generating Pythagorean Triples. He also developed a general method for squaring and extended Tirthaji cross-multiplication method for solving systems of linear equations.

Krishna Prasad Karani (2016) did a study and concluded that Vedic Mathematics is an Indian ancient system of mathematical calculations or operations techniques developed in the year of 1957 with 16-word formulae and some sub-formulae. In competitive examinations, students find difficult to solve the aptitude questions effectively with very less or small time durations. Even though students are able to understand the problem, they are not able to speedup calculation process.

Dhara R. Joshi (2017) conducted a study to find out the relevance of Vedic mathematics in present modern era. He found that vedic mathematics can be useful for fastest growing & even changing world in modern era. Vedic mathematic algorithm can be proved efficient for faster mental calculations & for competitive exams.

He said that Vedic mathematics is an ancient scheme based on 16 formulas (sutras). These are easy & simple methods for fast mental calculations. Many researcher have worked on it for its usefulness in various branches like engineering, astronomy, mathematics. Vedic mathematics helps in faster and accurate mental calculations by this 16 sutras & 13 up sutras. One can solve any difficult equation in addition, division, multiplication, algebra, trigonometry, square, square root, cube, cube root only by mental calculations. Today's era is fastest growing & ever changing era.

Eason, Rod (2018) did a study which includes a discussion of the evolution of modern science and a comparative view of Maharishi Vedic Science, the combination of which represents a new paradigm for the advancement of scientific knowledge. Research in consciousness is discussed from several points of view and also includes a connection with the physiology. The structure of the Veda and Vedic Literature is discussed at length with examples of the text included.

V. CONCLUSION

In a nutshell it can be said on the basis of above discussion that Vedic Mathematical Operations can prove a game changer in the field of Mathematics. It is the need of the hour that Government of India and Mathematicians should give this Indian system of mathematical operation its due place.
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