

A Teacher's Viewpoint of Vedic Mathematics

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Abstract

Vedic Mathematics is the name given to an ancient system of calculation which was rediscovered from the Vedas between 1911 and 1918 by Sri Bharati Krishna Tirthaji Maharaj. Vedic Mathematics is based on 16 sutras or formulas and their 13 sub-sutras or corollaries. These sutras are able to solve complex calculations with ease and simplicity. Complex mathematical problems can be solved in less time compared to conventional mathematical procedures. Vedic Mathematics is said to manifest a coherent and unified structure of arithmetic. Its methods are direct and easy. The sutras not only develop our logical thinking, but also encourage innovation. But Vedic Mathematics is not without its critics. In this paper the strengths and perceived weaknesses of Vedic Mathematics are assessed. In conclusion, an attempt is made to answer the question whether or not Vedic Mathematics should form part of a school curriculum.

An Introduction to Vedic Mathematics

Vedic Mathematics is the name given to an ancient system of mathematics, or to be more precise, a unique technique of calculation which was rediscovered from the Vedas between 1911 and 1918 by Sri Bharati Krishna Tirthaji Maharaj. The entire system is based on 16 sutras (formulas) and their 13 sub-sutras (corollaries) which were established by Tirthaji. (Sri Tirthaji, the founding father of Vedic Mathematics, was the apostolic successor of the first Shankaracharya of Govardhan Matha of Puri, Odisha.). Tirthaji formulated these sutras from studying the ancient Vedic texts and applying his keen insight to the natural processes of mathematical reasoning. The methods described by the sutras, which are the outcome of Tirthaji's pioneering work, can be used to solve complex calculations with simplicity and ease. For example, the product of 6234 and 5472 can be found in about 40 seconds, while it may take more than three minutes when applying conventional methods. The answers to difficult problems and huge sums can often be found immediately by application of the sutras. The calculation processes described by Vedic Mathematics sutras are more systematic, flexible, organized, coherent and unified than those of the conventional system of mathematics. In short, Vedic Mathematics offers a new approach and an added dimension to conventional mathematics.

The Importance of Vedic Mathematics

Vedic mathematics assists and enhances the conventional mathematical system. The value lies in the fact that the calculations can be done mentally, although the methods can be written down as well. There are just 16 sutras which can solve most mathematical problems, ranging from simple to complex ones; they cover almost all the branches of mathematics as well: algebra, arithmetic, geometry, trigonometry, conics, calculus (both differential and integral), applied mathematics of all kinds, dynamics, hydrostatics etc.

Vedic mathematics is a flexible mental system by which students develop problem solving abilities. It also inculcates creativity and imagination in students. Since mental activity and alertness is integrated within it, Vedic mathematics keeps the mind actively working, and enhances cognition. The methods are very effective, complementary, and direct. Because calculations can be completed very quickly this approach can offer students a competitive edge. For example, Neha Manglik, a 22-year old girl, and a CAT 2014 topper who scored 100 percent, mentioned that she learnt Vedic mathematics to improve her problem-solving speed.

Instead of learning by repetition, Vedic mathematics involves logical thinking, as well as an understanding of fundamental concepts. Many of the processes involved can be found elsewhere, but a unique quality of the Vedic approach is its orientation and coherence. The whole system is beautifully interrelated and unified. For example, the conventional multiplication method is easily reversed to allow one-line divisions and the simple method of squaring can be reversed to give one-line square roots. This unifying quality of the system makes mathematics enjoyable and easy. It also promotes innovative thinking.

Applications of Vedic mathematics can be found in the fields of Information Technology, Digital Signal Processing, Discrete Fourier Transform, Chip Designing, Economics, MBA and many more. Such is the versatility that even scientists from NASA have investigated the application of its principles.

An unfortunate truth about mathematics is the phobia possessed by many students. Many mathematics teachers would welcome an approach that is less intimidating to students. Vedic mathematics can help in this regard as it provides an intuitive and thought-provoking way to teach and learn the concepts and skills. Furthermore, the unconventional methods employed by

the system make learning interesting, pleasant and potentially even delightful for students. It can also be used as a powerful checking tool. The sutras have pedagogical value and can increase students' general understanding of mathematics.

Without doubt, there are many advantages to learning Vedic mathematics. However, its true beauty and potency cannot be fully appreciated without practising the system. To this end, Vedic mathematics should be made part of school curriculum.

But Vedic Mathematics is not without its critics.

Having discussed its importance and strengths, the criticisms towards and reputed weaknesses of this approach also need to be considered. The controversy will then be critiqued. An opinion is then offered as to whether Vedic Mathematics should be included in school curricula or not.

Criticism/Critique of Vedic Mathematics

According to critics, the Vedas do not contain any of the Vedic mathematics sutras, and the sutras themselves do not make any reference to the Vedas. The so-called 'Vedic Mathematics' is therefore neither 'Vedic' nor can it be dignified by the name of mathematics. Other views claim that everything is Vedic in 'Vedic Mathematics'. In fact Tirthaji obtained his revelations from a particular portion of the Atharva Veda called the Ganita Sutra (also known as Sulbha Sutra). Furthermore, the current Shankaracharya of Puri, Swami Shri Nischalanandaji Saraswati revealed that one of the sub-sutras belongs to the Srimad Bhagvata Purana - an ancient Indian text (10.3.25).

More importantly, such critics rely only on a narrow, and therefore inadequate, interpretation of what constitutes the Vedas. The Vedas should not be viewed in a restricted sense. The term 'Veda' means knowledge and not something only from history. This perspective is further illustrated by the Supreme Court of India in a judgment in 2002 on Vedic Mathematics, wherein it clearly stated: "It is pointed out that, merely because the epithet 'Vedic' is used, the petitioners have attempted to attribute something of religion to it. The word 'Vedic' in this context indicates only the time factor."

Another prevalent criticism of Vedic mathematics is that it constitutes nothing but a collection of clever tricks to solve arithmetic and algebra problems and that it has no relevant terminology. It

has also been pointed out that the sutras have practically nothing in common with the mathematics of the Vedic period.

In actual fact, Vedic mathematics is concerned with the basic structure of mathematics as revealed through personal approaches to problem-solving in mathematics and other fields of human activity. The sutras represent naturally occurring mental processes, by which any mathematical problem can be solved by as little effort as possible. As an example, when adding 199 to 237, an easy way is to add 200 to 237, and then subtract one, resulting in the answer 436. Such special cases are not normally taught, but most people adopt them through their personal understanding of numbers. This method or approach comes under the pithy sutra, “Deficiency”. It must be emphasized that Vedic mathematics highlights the mental processes and principles taking place in the mind of a person involved in mathematical activity. Thus, the sutras are not tricks, but rather they outline methods which are reasonable, ordered and yet flexible. So, while Vedic mathematics appears to be “bag of tricks” with no mathematical foundation, in fact each and every sutra can be proven mathematically. A book about the proofs exists.

According to critics, mathematics is an advancing and expanding field, whereas Vedic mathematics has not grown beyond the 16 sutras. The truth is that it provides a new orientation to the subject. Vedic mathematics is not historical and is not about mathematical tricks but rather expresses ways of natural mental thinking and encourages easy routes for problem-solving and development of critical thinking. The sutras provide a new exemplar to the subject, which undoubtedly results in a unified approach because each sutra has multifarious applications. By way of the sutras, different branches of mathematics can be connected. Vedic mathematics unifies diversity.

The impact of the approach on mathematics education remains largely unexplored. There is scope for research into this. Research and intensive study of Vedic mathematics might reveal even more advanced applications and may even, in the future, provide revolutionary results.

Vedic mathematics came into the limelight after Narendra Modi’s government put emphasis on this ancient and forgotten knowledge system of India. Interest in Tirthaji’s system is increasing. But the practicality of Vedic mathematics in the age of calculators and computers is still debated.

As mentioned before, some critics brush it away as being a bag of tricks. According to them, shortcuts and tricks should never be a part of a school curriculum. The teaching of mathematics involves both the processes of explaining the basic concepts of the subject, coupled with showing and practising the methods of mathematical computation. To the critics, Vedic mathematics is entirely inadequate to this task. They maintain that it cannot impart a deeper understanding of the subject and thus cannot serve these purposes.

However the truth is far different from this misconception. Mathematics is a field which involves thinking and using the mind at its best. In India, most of the students studying conventional mathematics can solve problems that are taught to them at school, but are unable to think beyond this scope. They face difficulty in solving problems that are new to them and not taught to them. The reason for this is the lack of clarity about basic concepts. Mental mathematics is important and necessary for the development of number sense in a child at primary school level. No amount of technology can replace this. It is here that Vedic mathematics proves very useful and effective, as it uses short and efficient sutras to express principles and rules of working. It also encourages easy problem-solving routes and develops decisive thinking. Practising Vedic mathematics can relieve some of the the phobia surrounding the subject and can introduce creativity and confidence in intelligent students. It also helps slower learners to grasp the basic concepts of mathematics more easily.

Increased use of the methods can help make mathematics an engaging and interesting subject. Today in India, Vedic mathematics has been adopted by three universities. It is hoped that the day is not far off when Vedic mathematics will be found in the curriculum of every University or Board.

Conclusion

From my perspective as a teacher, I have observed how the sutras are relevant in educating students who, nowadays, have to absorb, understand and integrate vast quantities of information. Vedic Mathematics is an asset and, in this age of tremendous competition, its methods can be a very useful tool for students. Through the use of the methods, a subject which is often experienced as “scary”, can be learnt and mastered with minimum effort and can be transformed into a subject that causes both delight and the deepening of insight.

In my opinion, Vedic mathematics should be made a part of the school curriculum. Students will definitely benefit from it.

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