

## [Summing Up "Vedic Math"](#)

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### BOOKS

## Summing Up "Vedic Math"

Is Swami Bharati Krishna's system a step in the right direction?

There has been a recent upsurge in interest in Vedic Mathematics. It's a controversial subject, as we'll see in the course of reviewing three books on the system published in India

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In the last twenty years that I have been teaching college math in North America, I have observed a decline of knowledge among students for basic calculations, such as their times tables. I feel this is a result of teachers allowing their students to use calculators in elementary school, often beginning as early as the second or third grades. The system of "Vedic Math" especially as presented by J. T. Glover (Vedic Mathematics for Schools, Book One, Motilal Banarsidass) is excellent in helping students learn basic arithmetic, fractions, decimals and as an introduction to beginning algebra. It is based upon the work in Vedic mathematics of Jagadguru Swami Sri Bharati Krishna Tirthaji Maharaja (1884-1960), Shankaracharya of Puri. Glover's book contains Vedic quotes, traditional stories involving numbers and even a chapter on

the esoteric meaning of numbers.

Vedic Mathematics for Schools will help the student learn how to manipulate numbers and estimate answers so that numbers and calculations have intuitive meaning. Students, I have found, tend to believe the calculator display as if it were the word of God. They don't think about whether it gives a reasonable answer or not. For example, a student knows that 32 degrees Fahrenheit is freezing and is equal to 0 degrees Celsius. So if he is given 36° F and thinks about it, he should intuit that the equivalent in Celsius must be greater than 0°. But with calculators, students tend not to think about it and if, by chance, they put in the wrong formula and get the wrong answer, they have no intuitive sense that there is a mistake. When I tell them they are wrong, they will hold up the calculator and say the answer must be right because the calculator displays it! All students know that 1,000 is more than 10, but many do not know how much more and have little sense of reasonableness in doing even basic arithmetic. To some extent, Vedic mathematics can help remedy this situation.

There are two other books, also published by Motilal Banarsidass, Vedic Mathematics, by Swami Bharati Krishna, which is the central book on the subject, and Issues in Vedic Mathematics, edited by H.C. Khare, a compilation of papers given at a 1988 workshop held at the University of Rajasthan, Jaipur.

Vedic mathematics is said to have been rediscovered from the Vedas between the years 1911 and 1918 by Bharati Krishna

Tirthaji. According to him, he reconstructed sixteen mathematical formulae from sixteen sutras, short verses summing up a principal or method, which he found in the Parisista (appendix) of the Atharva Veda. Swamiji said that he wrote a volume for each of the sixteen sutras and left them at the home of a disciple. Later these were lost and in 1957 he rewrote the sixteen formulae from memory. These were published in 1965 together with explanations and examples in his book, Vedic Mathematics.

Swami's book looks at almost every aspect of elementary mathematics, from multiplication and division to integral calculus. He has a very ingenious perspective for working out problems. The methods employed for basic arithmetic are useful and universal, which is why Glover's book is effective. But for algebra and calculus, Swami's solutions apply only to unique problems, and not to general cases. For example, he gives a method to find the reciprocal of two-digit numbers ending in 9, such as  $1/19$ th. It's easy enough for a third grader to master, but only works for 8 fractions, or 8.9% of all two-digit fractions. The method has little practical use in the run-of-the-mill type of problem encountered. [See sidebar below for one sutra.]

One goal of mathematics is to attain general solutions to problems. Sometimes problems have to be split up into different cases where each case may have a different type of method for attaining a solution. But the goal is to keep the number of cases small so that each technique is broad in its usage. Swamiji's techniques are the reverse, being specific cases without broad application.

There are also scholars who dispute that the work of Bharati Krishna has been drawn from the Vedas. For example, in *Issues in Vedic Mathematics*, K.S. Shukla, Professor of Mathematics, Lucknow University, states, "The title of the book, *Vedic Mathematics*, written by Bharati Krishna, bears the impression that it deals with the mathematics contained in the Vedas--Rig Veda, Sama Veda, Yajur Veda and Atharva Veda. This indeed is not the case, as the book deals not with Vedic mathematics but with modern elementary mathematics up to the intermediate standard." Shukla says that no existing appendix of the Atharva Veda contains the sixteen sutras, and when asked to produce them, Bharati Krishna was unable to. "It is evident," wrote Shukla, "that the sixteen sutras of Swamiji's Vedic mathematics are his own compositions. It is evident that the mathematics dealt with in the book is far removed from that of the Vedic period. Instead, it is that mathematics which is taught at present to high school and intermediate classes, the result of Swamiji's own experience as a teacher of mathematics in his early life. Not a single method described is Vedic, but the Swamiji has declared all the methods and processes explained by him as Vedic and ancient." I myself noticed Swami's method of partial fractions used in integral calculus was that originally developed in Europe in the 1800s.

Vedic Mathematics falls victim, in my opinion, to the common misconception that mathematics is a science based in computation. Math is not a science, but instead is both an art form and a language. Ramanujan, the great Indian mathematician (1887-1920), even said, "An equation for me has no meaning unless it expresses a thought of God." Math has been well adapted by the sciences to describe scientific phenomena. But the idea of math having to do just with

numbers and computations is the same as saying literature has to do with letters of the alphabet and spelling, which is true but insufficient to describe literature. A person's saying he is better at mathematics because he can calculate faster is like a person's saying he is better at writing literature because he can type 75 words per minute. Being able to calculate is not what the art of mathematics is about, but it is a common misconception fostered by nonmathematicians.

The field of Vedic mathematics warrants further study, but more in the nature of historical research. The development by Hindus of the system of base ten and the concept of zero is well known. Issues in Vedic Mathematics, in addition to critiquing the work of Swami Bharati Krishna, explores some of the other ancient contributions.

The development of creativity for the study of mathematics at a young age is helpful towards understanding advanced math. The Glover book gives an alternate view to computational arithmetic which helps the right side of the brain see a creative side to arithmetic and gain an enhanced perspective. Even so, Vedic math will never replace our present form of arithmetic.

### SUTRA

All from Nine and Last from Ten

Nikhilam sutra, according to Swami Bharati Krishna, allows one to multiply numbers up to 9 by 9 while only memorizing up to 5 by 5. His rule cryptically states "All from 9 and the last from 10". Here's nine times seven: Put the two numbers one above the other. Subtract each number from ten and write these differences or "remainders" to the right with a negative sign:

9: -1

7: -3

One way given to get the answer is as follows. The tens term of the answer is the first number minus the second remainder, i.e., nine minus three, which is six. The ones term is the product of the two remainders, i.e. one times three, which is three. Therefore the answer is 63. Five times five is the largest number one would have to memorize for this system.

Swami shows how to multiply larger numbers, such as 9,998 times 9,994. In this case, the numbers are subtracted from 10,000:

9,998: -2

9,994: -6

The answer is 9,998 minus six, which is 99,920 for the 10,000ths place; and two times six for the ones place which gives 99,920,012. This appears quite brilliant, but only works easily for numbers very near a power of ten, ie, 98, 998, 9,998, etc. With additional special methods, Swami says times tables up to 16 by 16 can be calculated mentally.

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