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Addition of Numbers Using Sutras of Vedic Mathematics

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Introduction

The Jagadguru Sankaracharya Swami Bharati Krishna Tirtha of Govardhana Matha discover the 16 sutras from Atharvaveda. These sixteen sutras cover almost all different parts of mathematics such as arithmetic, algebra, geometry, trigonometry, conics, astronomy, calculus. Using these sutras one can easily solve the mathematical problems which are considered to be hard. It is explained, a person who knows only simple addition and substraction, then it is not required to know the multiplication tables above 5*5, vedic formulas enable him to get the required products very easily and speedily. It has been observed that students appearing for competitive exams are adopting the formulas of vedic mathematics to solve many arithmetical problems. Doing calculations these days become a phobia and very boring process for students in the era of calculators and gazzets. These electronic machines can quickly solve the big calculatons but alongwith the use of these there comes a alarming situation of not using brain to solve even small calculations. The time required to complete and mastering the whole course of vedic mathematics is around 8 to 12 months with an average of 2 to 3 hours per day instead of 15 to 20 years required according to existing systems of the Indian and also foreign universities. In this article, we are elaborating all the sixteen sutras[?] and their subsutras with their meaning. We also discuss the addition of two numbers with the help of these sutras.

Sixteen Sutras of Vedic Maths

The sixteen sutras are explained here alongwith there meaning.

S. No.	Sutra	Meaning
1	Ekadhikena Purvena (एकाधिकेन पूर्वेण)	One more than the previous one
2	Nikhilam Navatascaramam Dasataḥ (निखिलम् नवतश्चरमम् दशतः)	All from nine and last from ten
3	Urdhva Tiryagbhyam (ऊर्ध्वतिर्यक्भ्याम्)	Verically and crosswise
4	Paravartya Yojayet (परावर्त्य योजयेत्)	Transpose and apply
5	Sunyam Samyasamuccaye (शून्यं साम्यसमुच्चय)	The summation is equal to zero
6	(Anurupye) Sunyamanyat (आनुरूप्येण)	If one is in ratio, other one is zero.
7	SankalanaVyavakalanabhyam (संकलन व्यवकलनाभ्यां)	By addition and sustraction
8	Puranapuranabhyam (पूर्वापरयुक्त्याभ्यां)	By completion and noncompletion
9	CalanaKalanabhyam (चलनकलनाभ्याम्)	Sequential motion
10	Yavadunam (यावदूनं)	The dificiency
11	Vyastisamastih (व्यष्टिसमष्टिः)	Whole as one and one as whole.
12	Sesanyankena Caramena (शेषाण्यङ्केन चरमेण)	Remainder by last digit.
13	Sopantyadvayamantyam (सोपान्त्यद्वयमन्त्यम्)	Ultimate and twice the penultimate
14	Ekanyunena Purvena (एकन्यूनेन पूर्वेण)	By one less than the previous one.
15	Gunitasamuccayah (गुणितसमुच्चयः)	The whole product is same
16	Gunakasamuccayah (गुणितसमुच्चयः)	The collectivity of multipliers.

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SubSutras

The sixteen vedic subsutras are explained here with there meaning:

S. No.	SubSutra	Meaning
1	Anurupyena (आनुरूप्येण)	Proportionately
2	Sisyate Sesasamjnah (शिष्यते शेषसञ्ज्ञा)	Knowing remainder from remainder
3	Adyamadyenantyamantyena (आद्यमद्येनान्त्यमन्त्येन)	First by first and last by last.
4	Kevalaih Saptakam Gunyat (केवलैः सप्तकं गुणयात्)	Only multiple X
5	Vestanam (वेष्टनम्)	Osculation
6	YavadunamTavadunam (यावदूनं तावदूनम्)	Whatever be the deficiency, lessen it further
7	Yavadunam Tavadunikrtya Varganaca Yojayet (यावदूनं तावदूनीकृत्य वर्गं च योजयेत्)	Whatever the extent of its deficiency, lessen it further to that extent and set up the square of deficiency.
8	Antyayotdasakepi (अन्तययोर्दशकेऽपि)	When the sum of the last digits is ten
9	Antyayoreva (अन्त्ययोरेव)	Only the last term
10	Samuccayagunitah (समुच्चयगुणितः)	Sum of the coefficients in the product.
11	Lopanasthapanabhyam (लोपनस्थापनाभ्याम्)	By Elimination and Retention
12	Vilokanam (विलोकनम्)	The product of the sum of coefficient
13	Gunitasamuccayah Samuccaya gunitah (गुणितसमुच्चयः समुच्चयगुणितः)	The product of sum of the coefficients in the factor is equal to the sum of the coefficients in the product

Addition using vedic sutras

The sutras used here for the addition are:

- By one more than the previous one: This sutra decribes the generation of numbers from unity.
- By the deficiency: This rule helps to ease the addition by completing a number in a multiple of ten and tehn adding to another number easily and subtracting the deficiency in resulting number.

Examples

Here are some examples on the above two sutras:

1. **By completion and noncompletion:** If the number are less than 10 make the pairs to get sum 10. If number are greater than or equal to ten, make the pairs of number to get sum 10or in multiple of tens.

Example:

(a) To make pairs of numbers, 1 + 9 = 10, 2 + 8 = 10, 3 + 7 = 10, 4 + 6 = 10, 5 + 5 = 10

(b) To make pairs of numbers in multiple of tens, 24 + 26 = 20 + 4 + 20 + 6 = 20 + 20 + 10

(c) If there is a list of numbers to be added then first make the pair of numbers whic sums to 10 or multipe of 10.

7 + 6 + 3 + 4 = 7 + 3 + 6 + 4 = 10 + 10 = 20.

48 + 16 + 61 + 32 = 48 + 32 + 16 + 1 + 60 = 80 + 17 + 60 =

97 + 60 = 157

2. **By deficiency:** When the given numbers in sum are not proper multiple of 10, we make them in multiple of 10 by adding and subtracting the required number.

Example: To add 59 + 4 first we make 59 to 60 by adding 1 which is taken by 4 so now we add 60+3 = 63. Similarly, 38+24 = 38+2+22 = 40 + 20 + 2 = 62.

Addition using vedic maths

In Vedic mathematics, we do addition from left to right instead of conventional method in which we do calculation from right to left. Doing calculation from left to right is very easy when we do mental calculation. In vedic maths the carrying over method is not used. The sutra used for this kind of addition is (एकाधिकेन पूर्वेण). The procedure consists of following steps:

- Add the unit digits coloumn wise starting from left.
- When the running total becomes greater than 10, put a dot or tick on that number.
- Move ahead with the excess of ten and add it to the next digit of the coloumn.

- In last, count the number of dots or ticks and note it down to the number next to unit place and add both.

Example

486 + 654 + 987 =?

Solution:

$$\begin{array}{cccc} & 4 & 8 & 6 \\ & \overline{6} & \overline{5} & \overline{4} \\ + & 9 & \overline{8} & 7 \\ \hline & 9 & 1 & 7 \end{array}$$

Explanation:

- 6 + 4 = 10, so take away the excess 0(10 10 = 0) and add it with the next digit 7 of the first column. Write final sum 7 in the raminder coloumn. Put a bar over 4.
- 8 + 5 = 13, write the excess 3(13 10 = 3) in the remainder coloumn and put a dot over 5. The excess 3 will be added to 8, making it equal to 11. Hence mark on 8 and write 1 in answer coloumn. Similarly in third coloumn. Now count the number of bars in each coloumn

$$\begin{array}{cccc} & 9 & 1 & 7 \\ 1 & 2 & 1 & \\ \hline 2 & 1 & 2 & 7 \end{array}$$

Conclusion

In this article, we presented the 16 vedic sutras given in our ancient scriptures and was first presented in [1]. We also presented the addition methods using the sutras. These 16 sutras are very useful for quick calculations and easily understandable.

References

1. Krisna, Tirtha Ji, Swami Bharti. Vedic Mathematics, Delhi: Motilal Banarsi Das Publishers, 1965.
2. Rajesh kumar Thakur, The Essentials of Vedic Mathematics, 2013