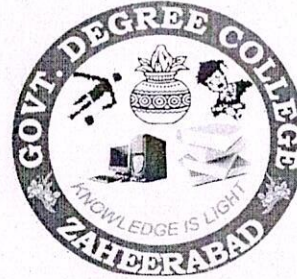


Govt. Degree College Zaheerabad



Student Study Project

Topic: Importance of Vedic Mathematics

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Name Of The Guide: T Bhojadas (Lecturer In Mathematics)

JIGNASA

A PROJECT WORK

ON

IMPORTANCE OF VEDIC MATHEMATICS

DEPARTMENT OF MATHEMATICS

GOVERNMENT DEGREE COLLEGE

ZAHEERABAD

OSMANIA UNIVERSITY

TELANGANA STATE

Submitted by

B.Sc (M.P.C) T/M

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CERTIFICATE

This is to Certify that M. Raju, M. Swapna, K Rachanna, Mohan Singh, Baga Reddy, students of Mathematics, Govt. Degree College Zaheerabad, has completed the project on the topic of "Importance of Vedic Mathematics under the supervision and guidance of Sri.T. Bhojadas, Lecturer in Mathematics, Govt. Degree College Zaheerabad.

To best of my Knowledge the report is original and has not been copied or submitted anywhere else.It is an independent work done by him.

GUIDE

(T. Bhojadas)


PRINCIPAL

DR.K.SRINIVASA RAJU

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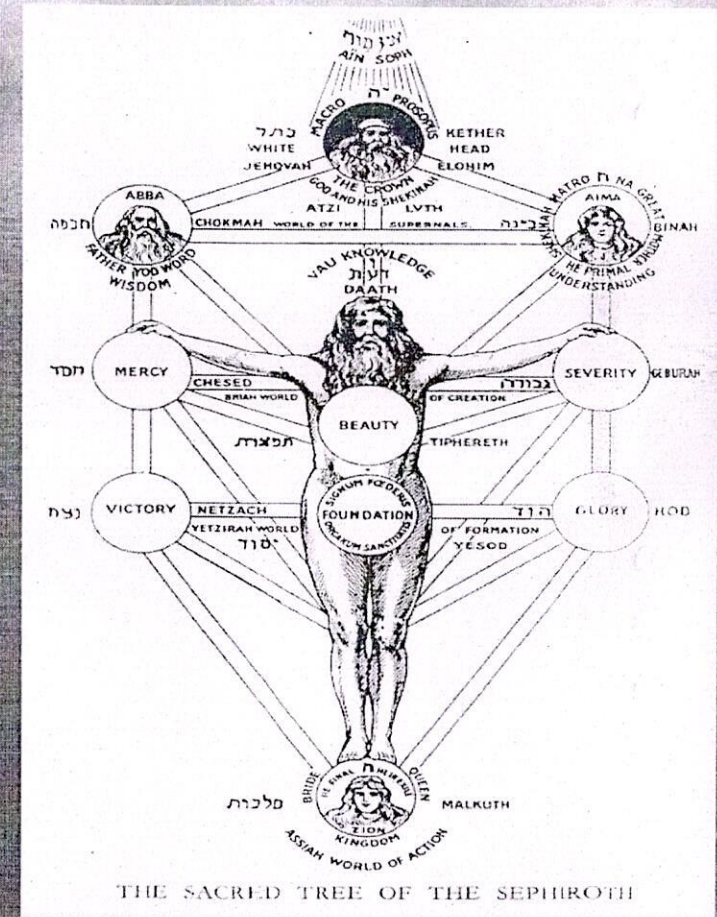
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VEDIC
MATHEMATICS

What is Vedic Mathematics ?

- ❖ Vedic mathematics is the name given to the ancient system of mathematics which was rediscovered from the Vedas.
- ❖ It's a unique technique of calculations based on simple principles and rules, with which any mathematical problem - be it arithmetic, algebra, geometry or trigonometry can be solved mentally.



Why Vedic Mathematics?

- ❖ It helps a person to solve problems 10-15 times faster.
- ❖ It reduces burden (Need to learn tables up to nine only)
- ❖ It provides one line answer.
- ❖ It is a magical tool to reduce scratch work and finger counting.
- ❖ It increases concentration.

Time saved can be used to answer more questions.

Improves concentration

Logical thinking process gets enhanced.

Base of Vedic Mathematics

❖ Vedic Mathematics now refers to a set of sixteen mathematical formulae or sutras and their corollaries derived from the Vedas.

चलनकलनाभ्याम्	Differential Calculus
यावदूनं	By the Deficiency
व्यष्टिसमष्टिः	Specific and General
शेषाण्यडेन चरमेण	The Remainders by the Last Digit
सोपान्त्यद्वयमन्त्यं	The Ultimate and Twice the Penultimate
एकन्यूनेन पूर्वने	By One Less than the One Before
गुणितसमुच्चयः	The Product of the Sum
गुणकसमुच्चयः	All the Multipliers

EKĀDHIKENA PŪRVEṆA

❖ *The Sutra
(formula)
Ekādhikena
Pūrvena means:*

*“By one more than
the previous one”.*

❖ *This Sutra is
used to the*

*Squares of
numbers ending
in 5’.*

'Squaring numbers ending in 5'

❖ Conventional Method

$$\begin{array}{r} 65 \times 65 \\ 65 \\ \hline \times 65 \\ \hline 325 \\ 390 \times \\ \hline \underline{4225} \end{array}$$

❖ Vedic Method

$$65 \times 65 = 4225$$

('multiply the previous digit 6 by one more than itself 7. Than write 25)

NIKHILAM NAVATAS'CHARAMAM DASATAH

❖ *The Sutra (formula)*
NIKHILAM
NAVATAS'CHARA
MAM DASATAH
means :

*“all from 9 and the
last from 10”*

❖ This formula can be very effectively applied in multiplication of numbers, which are nearer to bases like 10, 100, 1000 i.e., to the powers of 10 (eg: 96×98 or 102×104).

Case 1 :

When both the numbers are lower than the base.

❖ Conventional Method

$$97 \times 94$$

$$\begin{array}{r} 97 \\ \times 94 \\ \hline 388 \\ 873 \times \\ \hline 9118 \end{array}$$

Vedic Method

$$\begin{array}{r} 97 \quad 3 \\ \times 94 \quad 6 \\ \hline 9118 \end{array}$$

Case (ii) : When both the numbers are higher than the base

❖ Conventional Method

$$\begin{array}{r} 103 \times 105 \\ \quad 103 \\ \times 105 \\ \hline 515 \\ 000 \times \\ \hline 103 \times \times \\ \hline 10,815 \end{array}$$

❖ Vedic Method

For Example 103×105

$$\begin{array}{r} 103 \quad 3 \\ \times 105 \quad 5 \\ \hline 10,815 \end{array}$$

Case III: When one number is more and the other is less than the base.

❖ Conventional Method

$$\begin{array}{r} 103 \times 98 \\ \quad 103 \\ \times \quad 98 \\ \hline \quad 824 \\ \quad 927 \times \\ \hline \underline{10,094} \end{array}$$

Vedic Method

$$\begin{array}{r} 103 \quad 3 \\ \times \quad \underline{98} \quad \underline{-2} \\ \hline \underline{10,094} \end{array}$$

ĀNURŪPYENA

❖ *The Sutra (formula)*
ĀNURŪPYENA
means :

'proportionality'

or

'similarly'

❖ This Sutra is highly useful to find products of two numbers when both of them are near the Common bases like 50, 60, 200 etc (multiples of powers of 10).

ĀNURŪPYENA

❖ Conventional Method

$$46 \times 43$$

$$46$$

$$\underline{\times 43}$$

$$138$$

$$\underline{184}$$

$$\underline{1978}$$

❖ Vedic Method

$$46 \quad -4$$

$$\underline{43} \quad \underline{-7}$$

$$\underline{1978}$$

X

-

-

ĀNURŪPYENA



Conventional Method

46 X 43

46

X 43

138

184

1978

Vedic Method

46 -4

X 43 -7

1978

-

-

ĀNURŪPYENA



Conventional Method

$$\begin{array}{r} 58 \times 48 \\ \quad 58 \\ \underline{\quad X48} \\ \quad 464 \\ \underline{242X} \\ \underline{2884} \end{array}$$



Vedic Method

$$\begin{array}{r} 58 \quad 8 \\ X \quad \underline{48} \quad \underline{-2} \\ \underline{2884} \end{array}$$

URDHVA TIRYAGBHYAM

❖ *The Sutra (formula)*

URDHVA
TIRYAGBHYAM

means :

"Vertically and cross
wise"

❖ This the general formula applicable to all cases of multiplication and also in the division of a large number by another large number.

Two digit multiplication by URDHVA TIRYAGBHYAM

❖ *The Sutra (formula)*

**URDHVA
TIRYAGBHYAM**

means :

*"Vertically and cross
wise"*

- Step 1: $5 \times 2 = 10$, write down 0 and carry 1
- Step 2: $7 \times 2 + 5 \times 3 = 14 + 15 = 29$, add to it previous carry over value 1, so we have 30, now write down 0 and carry 3
- Step 3: $7 \times 3 = 21$, add previous carry over value of 3 to get 24, write it down.
- So we have 2400 as the answer.

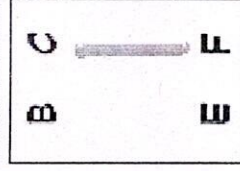
Two digit multiplication by URDHVA TIRYAGBHYAM

❖ Vedic Method

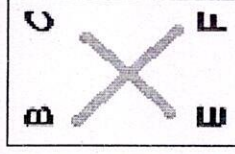
46

X43

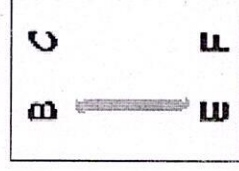
1978



Step 1: C X F



Step 2: BXF + CXE

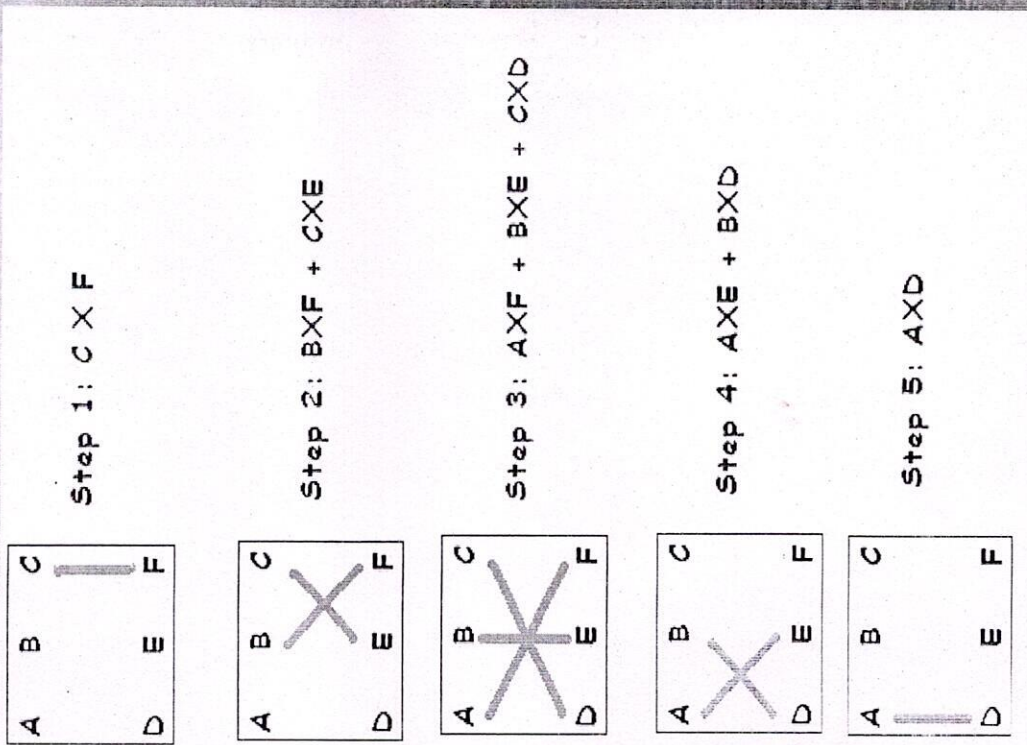


Step 3: B X E

Three digit multiplication by URDHVA TIRYAGBHYAM

❖ Vedic Method

$$\begin{array}{r}
 103 \\
 \times 105 \\
 \hline
 10,815
 \end{array}$$



YAVDUNAM TAAMDUNIKRITYA VARGANCHA YOJAYET

❖ This sutra means
whatever the extent
of its deficiency,
lessen it still
further to that very
extent; and also set
up the square of
that deficiency.

❖ This sutra is very
handy in
calculating squares
of numbers
near(lesser) to
powers of 10

YAVDUNAM TAAVDUNIKRITYA VARGANCHA YOJAYET

= 9604

- ❖ The nearest power of 10 to 98 is 100. Therefore, let us take 100 as our base.

Since 98 is 2 less than 100, we call 2 as the deficiency.

Decrease the given number further by an amount equal to the deficiency. i.e., perform $(98 - 2) = 96$. This is the left side of our answer!!.

- ❖ On the right hand side put the square of the deficiency, that is square of 2 = 04.
- ❖ Append the results from step 4 and 5 to get the result. Hence the answer is 9604.

Note While calculating step 5, the number of digits in the squared number (04) should be equal to number of zeroes in the base(100).

YAVDUNAM TAAVDUNIKRITYA VARGANCHA YOJAYET

$$103^2 = 10609$$

- ❖ The nearest power of 10 to 103 is 100. Therefore, let us take 100 as our base.
- ❖ Since 103 is 3 more than 100 (base), we call 3 as the surplus.
- ❖ Increase the given number further by an amount equal to the surplus. i.e., perform $(103 + 3) = 106$. This is the left side of our answer!!.
- ❖ On the right hand side put the square of the surplus, that is square of 3 = 09.
- ❖ Append the results from step 4 and 5 to get the result. Hence the answer is 10609.

while calculating step 5, the number of digits in the squared number (09) should be equal to number of zeroes in the base(100).

YAVDUNAM TAAVDUNIKRITYA VARGANCHA YOJAYET

$$99^2 = 1018081$$

SAÑKALANA – VYAVAKALANĀBHYAM

❖ *The Sutra (formula)*

SAÑKALANA –
VYAVAKALANĀB
HYAM

means :

**'by addition and by
subtraction'**

❖ It can be applied in solving a special type of simultaneous equations where the x - coefficients and the y - coefficients are found interchanged.

SAÑKALANA – VYAVAKALANĀBHYAM

Example 1:

$$45x - 23y = 113$$

$$23x - 45y = 91$$

❖ Firstly add them,

$$(45x - 23y) + (23x - 45y) = 113 + 91$$

$$68x - 68y = 204$$

$$x - y = 3$$

❖ Subtract one from other,

$$(45x - 23y) - (23x - 45y) = 113 - 91$$

$$22x + 22y = 22$$

$$x + y = 1$$

❖ Repeat the same sutra,

$$\text{we get } x = 2 \text{ and } y = -1$$

SAÑKALANA – VYAVAKALANĀBHYAM

Ex 2:

$$1955x - 476y = 2482$$
$$476x - 1955y = -4913$$

❖ Just add,

$$2431(x - y) = -2431$$

$$x - y = -1$$

Subtract,

$$1479(x + y) = 7395$$

$$x + y = 5$$

❖ Once again add,

$$2x = 4 \quad x = 2$$

subtract

$$-2y = -6 \quad y = 3$$

ANTYAYOR DAŚAKE'PI

❖ *The Sutra (formula)*

**ANTYAYOR
DAŚAKE'PI**

means :

**' Numbers of which
the last digits
added up give 10.'**

❖ This sutra is helpful in multiplying numbers whose last digits add up to 10 (or powers of 10). The remaining digits of the numbers should be identical.

For Example: In multiplication of numbers

- ❖ 25 and 25,
2 is common and $5 + 5 = 10$
- ❖ 47 and 43,
4 is common and $7 + 3 = 10$
- ❖ 62 and 68,
- ❖ 116 and 114.
- ❖ 425 and 475

ANTYAYOR DAŚAKE'PI

❖ Vedic Method

$$\begin{array}{r} 67 \\ \times 63 \\ \hline 4221 \end{array}$$

❖ The same rule works when the sum of the last 2, last 3, last 4 - - - digits added respectively equal to 100, 1000, 10000 - - - .

The simple point to remember is to multiply each product by 10, 100, 1000, - - as the case may be .

❖ You can observe that this is more convenient while working with the product of 3 digit numbers

ANTYAYOR DAŚAKE'PI

Try Yourself :

$$892 \times 808 \\ = 720736$$

$$398 \times 302 \\ = 120196$$

E)

$$795 \times 705 \\ = 560475$$

LOPANA STHÂPANÂBHYÂM

The Sutra (formula)

**LOPANA
STHÂPANÂBHYÂM**

means :

**'by alternate
elimination and
retention'**

❖ Consider the case of factorization of quadratic equation of type

$$ax^2 + by^2 + cz^2 + dxy + eyz + fzx = 0$$

❖ This is a homogeneous equation of second degree in three variables x, y, z .

❖ The sub-sutra removes the difficulty and makes the factorization simple.

LOPANA STHÂPANÂBHYÂM

Example :

$$3x^2 + 7xy + 2y^2 + 11xz + 7yz + 6z^2$$

- ❖ Eliminate z and retain x, y ;
factorize

$$3x^2 + 7xy + 2y^2 = (3x + y)(x + 2y)$$

- ❖ Eliminate y and retain x, z;
factorize

$$3x^2 + 11xz + 6z^2 = (3x + 2z)(x + 3z)$$

Fill the gaps, the given expression

$$= (3x + y)(x + 2y + 3z)$$

- ❖ Eliminate z by putting $z = 0$ and retain x and y and factorize thus obtained a quadratic in x and y by means of *Adyamadyena* sutra.

Similarly eliminate y and retain x and z and factorize the quadratic in x and z.

- ❖ With these two sets of factors, fill in the gaps caused by the elimination process of z and y respectively. This gives actual factors of the expression.

GUNĪTA SAMUCCAYAH - SAMUCCAYA GUNĪTAH

Example :

$$3x^2 + 7xy + 2y^2 + 11xz + 7yz + 6z^2$$

- ❖ Eliminate z and retain x, y ;
factorize

$$3x^2 + 7xy + 2y^2 = (3x + y)(x + 2y)$$

- ❖ Eliminate y and retain x, z;
factorize

$$3x^2 + 11xz + 6z^2 = (3x + 2z)(x + 3z)$$

Fill the gaps, the given expression

$$3x^2 + 7xy + 2y^2 + 11xz + 7yz + 6z^2 = (3x + y)(x + 2y + 3z)$$

- ❖ Eliminate z by putting $z = 0$ and retain x and y and factorize thus obtained a quadratic in x and y by means of *Adyamadyena* sutra.

- ❖ Similarly eliminate y and retain x and z and factorize the quadratic in x and z.

- ❖ With these two sets of factors, fill in the gaps caused by the elimination process of z and y respectively. This gives actual factors of the expression.