A GLIMPSE OF ORIGINAL INDIAN ALGEBRA

The erronuous belief today is, like numerals, number system and zero, Algebra also is of Arabian origin. But the well established fact is that *all of these are of Indian origin*.[1]

The algebraic solution of GANESA, on the previous page, was presented in today's language and style. Now I shall present the same solution in the original Indian style of GANESA'S times [A.D.1550] as close to the original as possible. Since we are conditioned so much by our contemporary style of thinking and working, a very simple introduction to Indian Algebra of GANESA'S times is in order.

No Signs between Terms: No 'signs', even basic signs like +, –, x, ÷, were used in Arithmetic or Algebra. The operations were implied by adjoining texts or were understood contextually. Like *product of 3 13 39*

Fractions & Mixed Numbers: Cost five *nishcas,* sold for five and a half *nishcas*; profit half a *nishca*. [*nishca* - unit of money like *pana, dramma, cacini etc.*]

This is written as Cost 5, Sold for $5\ \frac{1}{2}$, Profit $\frac{1}{2}$ *nishca*. No horizontal lines for fractions etc.

Negatives: A dot '•' above indicates negative. So $8\ \dot{3}$ is 8 less 3 [today's 8 – 3]

Four and a half can be written as $4\ \frac{1}{2}$ or $5\ \dot{\frac{1}{2}}$ or $\frac{4}{\frac{1}{2}}$ which meant

Four, half more; or Five, less half; or Four and a half.

Variables: The first letter य (ya) of the word यवठ त्तवठ (yavat-tavat, meaning 'how much, that much') was the **world's first variable**. Then the first letters *ca, ni, pi, lo* of the names of the colours black, blue, yellow and red were used. This was extended

[1] In the history of mathematical science, it has long been a question to whom the invention of Algebraic analysis is due? Which are the regions and the people who devised it, cultivated it and promoted it? The 'modern' Europe received it from the Arabs. "But the Arabs themselves scarcely pretend to the discovery of Algebra. They were not in general inventors but scholars during the short period of their successful culture of the sciences." The Greeks had the germs of Algebraic analysis much before the Arab civilisation. "This science in a more advanced state subsisted among the Hindus prior to the earliest disclosure of it by the Arabians to the modern Europe."

- Sir Henry Thomas Colebrooke [1817 A.D.] in his Desertation

by the first letters of green, white, other colours and terms of particular things and also by the letters of the alphabet etc.

Constants: Absolute numbers (today's constants) were denoted by रु (ru), the first letter of the word रुपम (rupam), as the numeral of every number has a definite *rupam* (shape).

य followed by a number indicates so many unknowns;
रु followed by a number indicates absolute number is so much;
य32 रु729 is like 32x + 729

Squares: Square is वद्यिम (*vargam* - square)*;* so यव is square of unknown.
यव 5 is 5 of the squares of the unknown, like today's $5x^2$.

य$\dot{3}$ is like – 3x and यव7 य$\dot{3}$ रु 4 is like $7x^2 – 3x + 4$.

Multiply य5 and रु3, get य15
Multiply य5 and य3, get यव15

Square य3 or य$\dot{3}$, get यव9.
When writing an algebraic expression, the first unknown written is य and this may be followed by other symbols for unknowns, if needed.

Solving Equation (Example): The two sides of the equation is written one below the other. In each type of terms, same quantities are subtracted (*equal subtraction*); large numbers are *reduced* by dividing be a common number, simplified, and finally the answer is appropriately multiplied by the divisor; etc.

Solve: यव3 य1024 रु14661
यव7 य1024 रु6561

Subtracting equal quantities, we get यव4 य0
Abridge absolute numbers (divide by 81), get 181 and 81; subtracting we get 100.
i.e. यव4 'equals' 100; यव 25 and so य 5.
But this was abridged by 81 and so multiply it by 9; unknown is 405.

How do you feel?