The Secret of High-speed mental computations
“There are things which seem incredible to most men who have not studied mathematics.” – Archimedes.

“Spiritually advanced cultures were not ignorant of the principles of mathematics, but they saw no necessity to explore those principles beyond that which was helpful in the advancement of God realization.”
– Vedic Mathematics and the Spiritual Dimension.
4 frailties

- We have imperfect senses.
- We fall into illusion.
- We make mistakes.
- We have cheating propensities.

Descending Vedic knowledge $\rightarrow$ Perfect

[CC Adi 2.86, CC Adi 7.107]
“Shulba Sutras” is the name given to those portions or supplements of the Kalpasutras, which deal with the measurement and construction of the different altars or arenas for religious rites.
In order to help the pupil to memorize the material studied and assimilated, they made it a general rule of practice to write even the most technical and abstruse textbooks in sutras or in verse (which is so much easier—even for the children—to memorize). And this is why we find not only theological, philosophical, medical, astronomical, and other such treatises, but even huge dictionaries in Sanskrit verse! So from this standpoint, they used verse, sutras and codes for lightening the burden and facilitating the work (by versifying scientific and even mathematical material in a readily assimilatable form)!

Ref. “Vedic Mathematics” by Bharati Krishna Tirtha Maharaja
Translation: Lord anointed with the yogurt of the milkmaids’ worship (Krishna), O savior of the fallen, master of Shiva, please protect me.
Spiritually advanced cultures were not ignorant of the principles of mathematics, but they saw no necessity to explore those principles beyond that which was helpful in the advancement of God realization. Intoxicated by the gross power inherent in mathematical principles, later civilizations, succumbing to the all-inviting arms of illusion, employed these principles and further explored them in an attempt to conquer nature. The folly of this, as demonstrated in modern society today, points to the fact that “wisdom” is more than the exercise of intelligence. Modern man's worship of intelligence blinds him from the obvious: the superiority of love over reason.

Ref. “Vedic Mathematics and the Spiritual Dimension” by B.B. Visnu Swami
Composed by sages Wording may change from age to age

Revealed Absolute Truth Every word unchanged eternally

VEDIC KNOWLEDGE

SRUTI

VEDAS
- Rg, Yajur, Sama, Atharva

UPAVEDAS
- Dhanurveda, Ayurveda, Gandharvaveda, Shapathaveda

VEDANAS

SMRTI

Itihasas
- Puranas, Itihhasas, Six Darshanas

Incaratras

VEDAS
- Rg, Yajur, Sama, Atharva

UPAVEDAS
- Dhanurveda, Ayurveda, Gandharvaveda, Shapathaveda

VEDANAS

VEDANTA SUTRA

Samhitas
- mantras

Brahmanas
- ritual explanation of mantras

Aranyakas
- esoteric explanation of mantras

Upanisads
- Jnana-kanda, philosophy of Brahman

Kalpa
- ritual details

Siksa
- pronunciation

Vyakarana
- grammar

Nirukta
- etymology

Chandhas
- meters

Jyotisa
- astronomy-time calculation

Srimad Bhagavatam
The ripened fruit of all Vedic literatures

Svetasvatara Upanisad

Svetasvatara Samhita

Svetasvatara Sutra

Vedic Texts

Nyaya
- (Gautama)
- (Epistemology, logic)

Vaisesika
- (Kanada)
- (Metaphysics)

Vedanta
- (Vyasa)
- (Philosophy of existence)

Mimamsa
- (Jaimini)
- (Hermeneutics)

Nyaya
- (Gautama)
- (Epistemology, logic)

Vaisesika
- (Kanada)
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- (Gautama)
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- (Kanada)
- (Metaphysics)

Vedanta
- (Vyasa)
- (Philosophy of existence)
Warm-up
Pick a number.

Double the number.

Add 10.

Divide by 2.

Subtract original number.
Write down a 3-digit number where digits are in decreasing order.

Reverse the digits and subtract it from the first number.

Reverse the digits of the result and add it to the result.
Cubic roots
<table>
<thead>
<tr>
<th>Digit</th>
<th>Cube</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>64</td>
</tr>
<tr>
<td>5</td>
<td>125</td>
</tr>
<tr>
<td>6</td>
<td>216</td>
</tr>
<tr>
<td>7</td>
<td>343</td>
</tr>
<tr>
<td>8</td>
<td>512</td>
</tr>
<tr>
<td>9</td>
<td>729</td>
</tr>
<tr>
<td>10</td>
<td>1000</td>
</tr>
<tr>
<td>Digit</td>
<td>Cube</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>64</td>
</tr>
<tr>
<td>5</td>
<td>125</td>
</tr>
<tr>
<td>6</td>
<td>216</td>
</tr>
<tr>
<td>7</td>
<td>343</td>
</tr>
<tr>
<td>8</td>
<td>512</td>
</tr>
<tr>
<td>9</td>
<td>729</td>
</tr>
<tr>
<td>10</td>
<td>1000</td>
</tr>
</tbody>
</table>
7 \quad 389017 \quad 3
<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>175616</td>
<td>238328</td>
<td>704969</td>
<td>103823</td>
</tr>
<tr>
<td>970299</td>
<td>39304</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10648</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Where did Vedas come from?
Squares, etc.
\[
\begin{array}{cc}
4 & 5 \\
\times \\
4 & 5 \\
\hline \\
20 & 25
\end{array}
\]
<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>16</td>
</tr>
</tbody>
</table>
How does it work?

\[(10a + b)(10a + c)\]

\[= 100a(a + 1) + bc\]
Exercises

Set 4 in the handout.
What’s the goal of Vedas?
Square roots
<table>
<thead>
<tr>
<th>Digit</th>
<th>Square</th>
<th>Last digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>49</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>64</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>81</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>
\[ 7396 > 85^2 \]
Exercises

784  2809
1296  4761
1849  5041

8649
What’re the two kinds of approaches enjoined in the Vedas?
Multiplication techniques
nikhilam navatas caramam dasatah

“All from 9, the last from 10”
All from 9, the last from 10

4 2 3 5 7 2 7

5 7 6 4 2 7 3
\[
\begin{array}{cc}
9 & 2 \\
9 & 6 \\
\hline
8 & 8 \\
\end{array}
\times
\begin{array}{c}
- \\
- \\
\hline
3 & 2 \\
\end{array}
= 
\begin{array}{c}
8 \\
4 \\
\hline
3 & 2 \\
\end{array}
\]
How does it work?

\[(x \pm a) (x \pm b)\]

\[= x(x \pm a \pm b) \pm ab\]
All from 9, the last from 10

<table>
<thead>
<tr>
<th>1</th>
<th>0</th>
<th>2</th>
<th>+</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>6</td>
<td>-</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>9</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Set 1 in the handout.
anurupyena

“Proportionately”
Proportionately

Base = 60 = 6 X 10

<table>
<thead>
<tr>
<th>6</th>
<th>3</th>
<th>+</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>5</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>6 X</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

\[ 6 \times 4 = 24 \]
\[ 6 \times 5 = 30 \]
\[ 6 \times 8 = 48 \]

\[ 2 + 3 = 5 \]
Proportionately

Base = 40 = 4 X 10

\[
\begin{array}{ccc}
6 & 3 & + \\
4 & 5 & + \\
4 X & 6 & 8 \\
& 2 & 7 & 2 & +11 & 5 \\
& 2 & 8 & 3 & & 5 \\
\end{array}
\]
Proportionately

\[
\begin{array}{ccc}
6 & 3 & +
\
4 & 5 & -
\
5 & 8 & -
\
2 & 9 & 0
\end{array}
\]

\[
\begin{array}{ccc}
13 & 5
\
5 & \bar{5}
\
\bar{5}
\
5
\end{array}
\]

Base = 50 = 5 \times 10
Proportionately

\[
\begin{array}{cc}
6 & 3 \\
4 & 5 \\
5 & 8 \\
2 & 9 \\
\end{array}
\] +

\[
\begin{array}{cc}
1 & 3 \\
5 & 5 \\
6 & 5 \\
3 & 5 \\
\end{array}
\] -

\[
\begin{array}{cc}
2 & 8 \\
2 & 8 \\
\end{array}
\] -1

Base = 50 = 100/2
Exercises

Set 2 in the handout.
Yavadunam tavadunikrtya varga ca yojayet

“Whatever the extent of its deficit or surplus, subtract or add still further to that extent respectively”
### Surplus and Deficit squares

Base = 100

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>2</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>
Surplus and Deficit + Proportionately

Base = 30 = 10 X 3

\[
\begin{array}{ccc}
2 & 9 & - \\
X & 2 & 9 & - \\
3X & 2 & 8 & 1 \\
8 & 4 & 1 \\
\end{array}
\]
How does it work?

\[ a^2 = (a + b)(a - b) + b^2 \]
Exercises

Set 3 in the handout.
Why are there seeming contradictions across different approaches to spirituality?
Urdhva tiryagbhyam

“vertically and cross-wise”
Vertically and cross-wise

\[
\begin{array}{ccc}
7 & 8 & 5 \\
3 & 6 & 2 \\
\end{array}
\]

\[
\begin{array}{cccccc}
21 & 6 & 7 & 6 & 0 \\
6 & 7 & 4 & 1 \\
28 & 4 & 1 & 7 & 0 \\
\end{array}
\]

Need second row when computing left to right.

Vinculum can be used to ease the process.
Multiplying by all 9’s

112 X 99

1 1 2
+1

- 2 1 2

1 1 0 8 8
Set 5 and 6 in the handout.
Thank you very much!