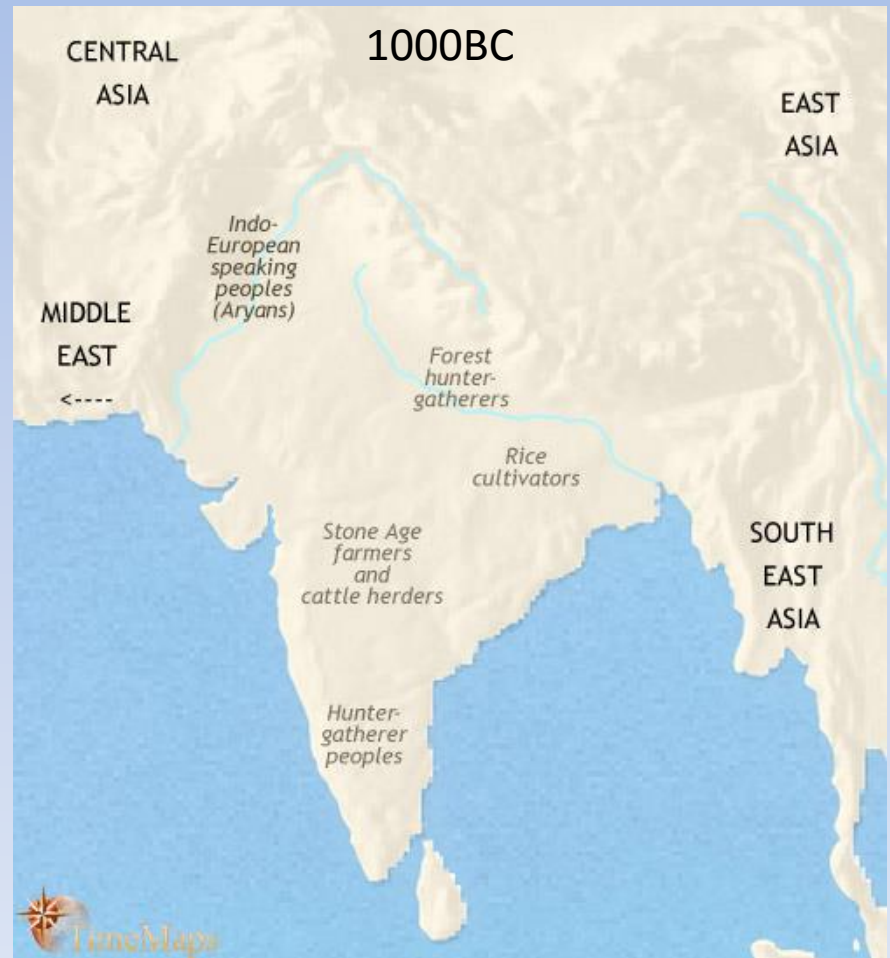


# Ancient Math From India

# The Vedic Age

- Textbook :  
1500 – 500 BCE
- Scriptures :  
>2500 BCE



# Vedas

- The **Vedas** (/ˈveɪdəz, ˈviː-/; Sanskrit: वेद véda, "**knowledge**") are a large body of texts originating in ancient India.
- Composed in **Vedic** Sanskrit, the texts constitute the oldest layer of Sanskrit literature and the oldest scriptures of Hinduism
- Four Vedas: the Rig Veda, Sama Veda, Yajur Veda and Atharva Veda.
- Transmitted orally from one generation to the next spanning more than 10,000 years. They came to us in written form between 4-6,000 years ago.

# Rigveda

- The Rig-Veda Samhita is the oldest significant extant Indian text. It is a collection of 1,028 Vedic Sanskrit hymns and 10,600 verses in all, organized into ten books
- Adoration of dieties
- Also dealt with other subjects, like the procedure of wedding, the folly of gambling.
- About two-thirds of Rigveda is about the gods Agni (Fire) and Indra (Ruler of the demigods).

# Yajurveda

- consists of archaic prose mantras and also in part of verses borrowed from the Rig-Veda
- Ritualistic and Sacrificial Worship



# Samveda

- The Sama-Veda is the 'Veda of chants' or 'Knowledge of melodies'. The name of this Veda is from the Sanskrit word saman which means a metrical hymn or **song of praise**.
- Book of hymns

# Atharvaveda

- Atharvaveda means the **Veda of the Wise and the Old**.
- It is associated with the name of the ancient poet Atharvan (The Wise Old One). It is also called Atharva-Angirasa, being associated with the name of another rishi, Angiras.
- Herbs, Waters, Mind, Body, Diseases, etc and Mathematics!!

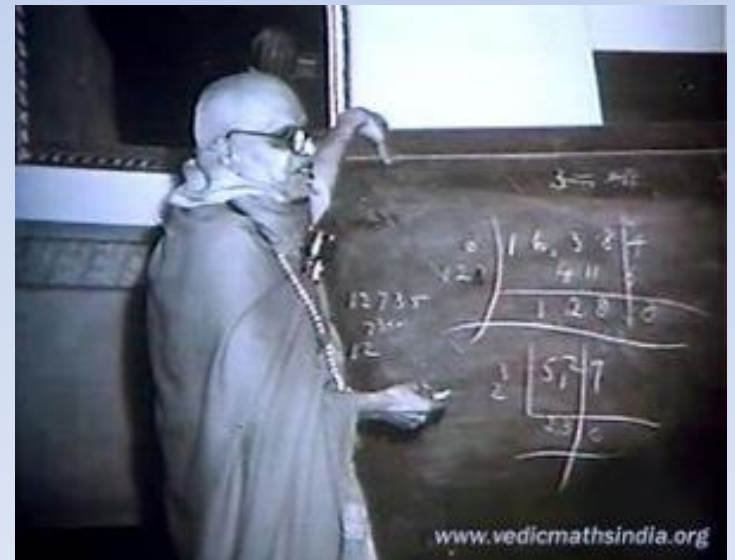
# Vedic Mathematics

- Vedic Mathematics is the name given to the ancient system of Mathematics which was rediscovered from the Vedas between 1911 and 1918 by Sri Bharati Krisna Tirthaji (1884-1960).
- gifted oratory in Sanskrit
- Masters (MA) degree in six subjects – Sanskrit, English, History, Philosophy, Mathematics and Science - American College of Sciences in Rochester, New York
- spent his next eight years studying advanced Vedanta philosophy
- Next few years spent in meditation





- **arithmetic:** algorithms for whole number multiplication and division, (flag or straight) division, fraction conversion to repeating decimal numbers, calculations with measures of mixed units, summation of a series, squares and square roots (duplex method), cubes and cube roots (with expressions for a digit schedule), and divisibility (by osculation).
- **Geometric** applications are reviewed for linear equations, analytic conics, the equation for the asymptotes, and the equation to the conjugate-hyperbola. Five simple geometric proofs for the Pythagorean theorem are given. [A 5-line proof of Apollonius' theorem is given.
- Physics, Trigonometry and astronomy



## The Main Sutras

By one more than the one before.

All from 9 and the last from 10.

Vertically and Cross-wise

Transpose and Apply

If the Samuccaya is the Same it is Zero

If One is in Ratio the Other is Zero

By Addition and by Subtraction

By the Completion or Non-Completion

Differential Calculus

By the Deficiency

Specific and General

The Remainders by the Last Digit

The Ultimate and Twice the Penultimate

By One Less than the One Before

The Product of the Sum

All the Multipliers

Write the numbers.  
Observe the pattern

# Muhammad ibn Musa al-Khwarizmi

Formerly Latinized as **Algoritmi**, was a Persian<sup>[3]</sup> mathematician, astronomer and geographer during the Abbasid Caliphate, a scholar in the [House of Wisdom](#) in [Baghdad](#).

In the 12th century, Latin translations of his work on the Indian numerals introduced the decimal positional number system to the Western world.

Al-Khwārizmī's *The Compendious Book on Calculation by Completion and Balancing* presented the first systematic solution of linear and quadratic equations in Arabic.

In Renaissance Europe, he was considered the original inventor of algebra, although it is now known that his work is based on older Indian or Greek sources



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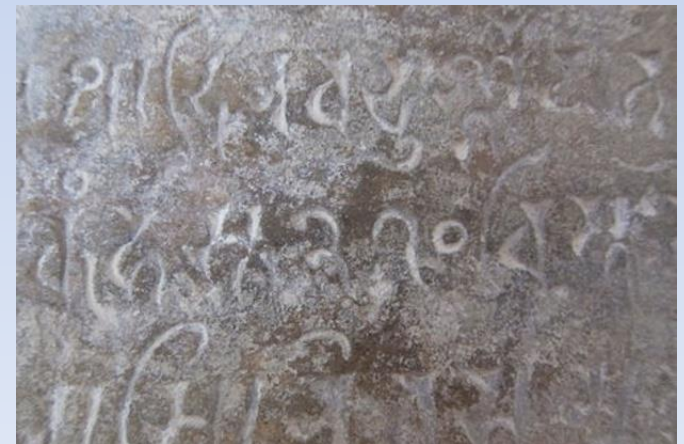
-Source Wikipedia

# What range of numbers did they know?

Indian semantic	International semantic	Indian comma placement	International comma placement
1 lakh	1 hundred thousand	1,00,000	100,000
10 lakhs	1 million	10,00,000	1,000,000
1 crore	10 million	1,00,00,000	10,000,000
10 crores	100 million	10,00,00,000	100,000,000
1 sael (arab)	1 billion	1,00,00,00,000	1,000,000,000
10 sael (kharab)	10 billion	10,00,00,00,000	10,000,000,000
100 sael (marab)	100 billion	1,00,00,00,00,000	100,000,000,000



- The use of zero, infinity, imaginary numbers and negative numbers
- Decimal place value System : Integers and fractions.
  - Chinese, Egyptian glyphs, Vedas . All older than 300 BCE
- Greeks and Romans are introduced to “babylonian numbers” around 150 BC .





~580 BC

Gautama Buddha is asked to “count” to the highest and lowest number he knows

*A yojana*, the Buddha said, is equivalent to:

Four *krossha*, each of which was the length of  
One thousand arcs, each of which was the length of  
Four cubits, each of which was the length of  
Two spans, each of which was the length of  
Twelve phalanges of fingers, each of which was the length of  
Seven grains of barley, each of which was the length of  
Seven mustard seeds, each of which was the length of  
Seven particles of dust stirred up by a cow, each of which was the length of  
Seven specks of dust disturbed by a ram, each of which was the length of  
Seven specks of dust stirred up by a hare, each of which was the length of  
Seven specks of dust carried away by the wind, each of which was the length of  
Seven tiny specks of dust, each of which was the length of  
Seven minute specks of dust, each of which was the length of  
Seven particles of the first atoms.

Physicists calculate:

say that a finger is 4 centimeters long. The Buddha's "first atoms" are, therefore, 4 centimeters divided by 7 ten times, which is 0.04 meter x 7 to the minus 10 or 0.00000000001416 meter

# Useful Links

- <http://www.hinduism.co.za/vedic.htm>
- Gresham College –  
<https://www.youtube.com/watch?v=wUP5rtwvsUI>
- Value of Pi 3<sup>rd</sup> century  
[https://www.youtube.com/watch?v=TiKoB8nli\\_d](https://www.youtube.com/watch?v=TiKoB8nli_d)
- <https://www.youtube.com/watch?v=hEca1MiE4GA>