



भारतीय
ज्ञान केन्द्रं

Bharatiya Ganitam

Mathematics is often called the queen of all sciences because it's the foundation for all sciences—physics, chemistry, astronomy, engineering, you name it.

यथा शिखा मयूराणां नागानां मणयो यथा ।

तथा वेदाङ्गशास्त्राणां गणितं मूर्धनि स्थितम् ॥

'Like the crest of the peacocks, like the gems on the hoods of the cobras, mathematics is at the top of the Vedanga Sastras.'

लौकिके वैदिके वापि तथा सामाजिकेपि यः ।

व्यापारस्तत्र सर्वत्र संख्यानमुपयुज्यते ॥

In all transactions relating to worldly, Vedic or other religious affairs, mathematics is essential.

Basically, without maths, none of the other physical sciences would exist. And the mathematics we use today? A lot of it actually came from our Bharat.

The concepts of zero, decimal places, negative numbers, fractions, algebra and trigonometry were all developed right here in India. Because of these mathematical advancements, India was way ahead of the game technology-wise. Bharat had made massive progress. In fact, till the 17th century, India had the largest share of the global GDP, leading the world along with China. This went on until colonial powers came in and messed up India's economy.



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Now, the Europeans and other western countries didn't really get very far with their science until they started learning mathematics from India. Just look at the Greek and Roman numerals. It is impossible to even make basic operations using them. To understand how the Western countries suddenly started developing their science and technology in the 17th century onwards, one needs to look back a little in history.

In the 8th and 10th centuries, Arabs invaded India and learned a lot about mathematics from the Indians they encountered. The caliphs in Baghdad saw the value of it and made sure to study it and apply it in their own countries.

On the flip side, Europe went into the dark ages for centuries on end from the 3rd century till the 14th century – for over a thousand years. The Europeans were still using old-school Greek and Roman numerals and weren't getting anywhere with science because their numerals and mathematical systems just didn't lend themselves to scientific advancement.

Then came the Crusades. European armies, trying to invade the Middle East, were often beaten by the more advanced Turkish and Arab forces. The Europeans learned about the advanced math the Arabs had picked up from India. They started calling the new number system "Arab Numerals," and algebra, which was invented by Brahmagupta in India, got labelled as "Al-Gebra" because people wrongly thought it was developed by the Arabs.

In the 13th century, the famous Italian mathematician Fibonacci, insisted on switching to the Indian numerals and the decimal place setting system instead of Roman numerals. The West only really started to progress in science and technology, after they switched to the Indian mathematical system.



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There were many great mathematical geniuses and scholars who were the people who developed our mathematics. Let's look at a few of them here.

- Baudhayana (800 BC - 740 BC). He is said to be the **Mathematician behind the Pythagoras theorem**. The now famous 'Pythagoras theorem' was indeed known much before Pythagoras, and it was Indians who discovered it, centuries before Pythagoras was born! The credit for authoring the earliest Sulba Sutras goes to Baudhayana.
- Acharya Pingala was an ancient Indian poet and mathematician who lived around 300 BCE, He was the creator of the chandas-sastra - the science of the meters. He was **the first to express the combinatorics of Sanskrit meter**. Because of this, Pingala is sometimes also credited with the first use of zero, as he used the Sanskrit word śūnya to explicitly refer to the number. He discovered the Meru Prastara which several centuries later led Pascal's Pyramid and later on to the Fibonacci series of numbers.
- Aryabhata Lived from 476–550 CE. Aryabhata is known as the father of Indian mathematics. He discovered theories on the rotation of the solar system, trigonometry, the value of Pi and the place value system. He wrote the Aryabhattya and the Arya-Siddhanta
- Brahmagupta who lived from 598–668 CE is famous for his Contributions to mathematics. He explained how to use zero in mathematical calculations, including dividing zero by any number. Brahmagupta established guidelines for working with negative numbers, including how to add, subtract, and multiply etc.. He developed the formula for the area of a cyclic quadrilateral, now known as Brahmagupta's Formula Brahmagupta solved systems of simultaneous equations, and recommended using "the pulveriser" to solve equations with



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multiple unknowns. He developed algorithms for square roots and the solution of quadratic equations. He calculated the circumference of the Earth, the path of several planets, the timing of eclipses, and the length of the solar year and contended that the Earth and the universe are spherical. Brahmagupta's work influenced mathematical thought for hundreds of years.

- Sridharacharya was an Indian mathematician and philosopher who lived in the 8th or 9th century. He was a pioneer in the use of algebra for practical applications and is known today for his method of solving quadratic equations.
- Bhaskara II Lived from 1114–1185 CE, He developed principles of differential calculus, He approximated the sine function. He derived a cyclic, chakravala method for solving indeterminate quadratic equations of the form $ax^2 + bx + c = y$. Bhaskara's method for finding the solutions of the problem $Nx^2 + 1 = y^2$ (the so-called "Pell's equation") is of considerable importance.
- Madhava of Sangamagrama was an astronomer who lived around 1340. Madhava is credited with discovering infinite series expansions for trigonometric functions such as sine, cosine, and tangent. These series, known as the Madhava series or the Kerala series, laid the foundation for later developments in calculus.
- Nilakantha Somayaji Lived from 1444–1544. He computed Pi (π) accurate to 9 decimals by improving Madhava's series; removed empirical elements. - Derived more accurate approximations of trigonometric functions using infinite series. He studied cyclic quadrilaterals and combinatorics and anticipated concepts of calculus.
- More recently, we have witnessed the achievements of Srinivasa Ramanujan. During the span of the last 500 years Bharat's



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brilliance in mathematics was disrupted by colonial invaders who tried to reset our educational systems. But our country's genius has shown signs of rebirth in the appearance of a Ramanujam in the twentieth century. He made substantial contributions to the analytical theory of numbers and worked on elliptic functions, continued fractions, and infinite series.

So, we can see why we should care about studying ancient Indian mathematics today. For one, it gives us a deeper understanding of India's rich intellectual history and how it contributed to global mathematics.

Concepts like the decimal system, zero, and algebra were game-changers that have shaped modern mathematics. In addition, when you dive into ancient Indian works like Lilavati and Ganitasaarsangraha, you see how mathematics was taught with real-world examples, making it easier to grasp and remember.

Bharatiya Ganitam should not be misunderstood as mere ancient arithmetic. Traditional Indian mathematics fosters deep conceptual thinking, sharp pattern recognition, and elegant problem-solving. What sets it apart is its seamless integration of intuition with structure, and imagination with precision.

In an age of AI — where machines can calculate and predict at incredible speeds, —human learners must move beyond rote computation toward true mathematical thinking: understanding the why, not just the how.

Ganitam becomes a vital bridge between logic and creativity—exactly the mind-set needed for meaningful collaboration with AI.

Bharatiya Ganitam is far more than working with numbers—it's an entirely different way of thinking



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Bhāratīya Ganitam

Once upon a time, long before the modern gadgets and technologies we know today, there existed an ancient civilization—a land filled with thinkers, dreamers, and trailblazers. This land was Bhārata, our India, and it was here that mathematics, or Bhāratīya Ganitam, flourished like nowhere else in the world. Imagine a world where there were no numbers as we know them, no zeros or decimal places. How would we solve problems? How would we build? Yet, in this mystical land, some of the brightest minds unraveled the mysteries of the universe through mathematics.

Let me take you back in time to meet some of the pioneers who changed the way the world thinks forever.

Baudhāyana, around 800 BCE, was one of the earliest mathematicians. Have you heard of the Pythagoras theorem? Well, it turns out Indians discovered it centuries before Pythagoras himself was born! Baudhāyana wrote about it in his Sulba Sutras, laying the groundwork for geometry.

Then there was **Ācārya Piṅgala**, a poet and mathematician from 300 BCE. He didn't just study numbers; he understood patterns and how they repeat in poetry and life itself. He even stumbled upon the concept of zero and something that would much later inspire the Fibonacci sequence—math hidden in nature!

The tale of **Āryabhaṭa**, the father of Indian mathematics, is truly inspiring. Living around 500 CE, he introduced the concept of Pi, the



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place value system and solved complex calculations about planetary motion. Imagine gazing at the stars and figuring out how they move—**Āryabhaṭa** did just that!

And then came **Brahmagupta**, who made zero a hero. Before him, no one had figured out how to work with zero in calculations. He laid down rules for negative numbers and quadratic equations, even measuring the Earth and predicting eclipses! His genius influenced the world for centuries.

The journey continued with **Bhāskara II**, a brilliant mind in the 12th century who developed calculus principles long before anyone in Europe even dreamed of it. He solved equations that seemed impossible and made math a tool for solving real-life problems. Bhaskara's method for finding the solutions of the problem $Nx^2 + 1 = y^2$ (the so-called "Pell's equation") is of considerable importance.

But math wasn't just about solving equations—it was about understanding infinity. **Mādhava**, an astronomer and mathematician from Kerala, discovered infinite series expansions for sine, cosine, and arctangent functions. These ideas were the seeds for calculus as we know it today.

Later, **Nīlakaṇṭha Sōmaiya** refined these theories and even computed the value of Pi with incredible precision—9 decimal places! He anticipated concepts of calculus long before it became a formal study.



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More recently, we have witnessed the achievements of **Srinivasa Ramanujan**. During the span of the last 500 years Bharat's brilliance in mathematics was disrupted by colonial invaders who tried to reset our educational systems. But our country's genius has shown signs of rebirth in the appearance of a Ramanujam in the twentieth century. He made substantial contributions to the analytical theory of numbers and worked on elliptic functions, continued fractions, and infinite series.

Over centuries, the wisdom of Bhārata's mathematicians travelled across the world. Indian numerals became the foundation for modern number systems. Zero, fractions, and algebra were adopted by Arabs, who passed them on to Europe. Did you know that "algebra" comes from Brahmagupta's work, though it was misunderstood as an Arabic invention?

So, why should young minds like you care about all of this? Because this isn't just history—it's a legacy. By understanding Bhāratīya Ganitam, we learn how our ancestors thought deeply, creatively, and boldly. Their work wasn't just numbers—it was a way of thinking that shaped the world.

Math is everywhere, from the stars above to the ground beneath your feet. And when you study it, you're not just learning equations—you're walking in the footsteps of giants.