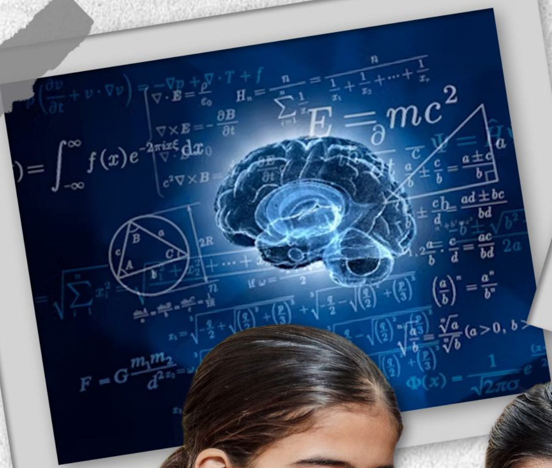
Nex-Gen Education 2.0

WHERE LEARNER BECOMES LEADER

CLC INTERNATIONAL SCHOOL

MATHOMANIA



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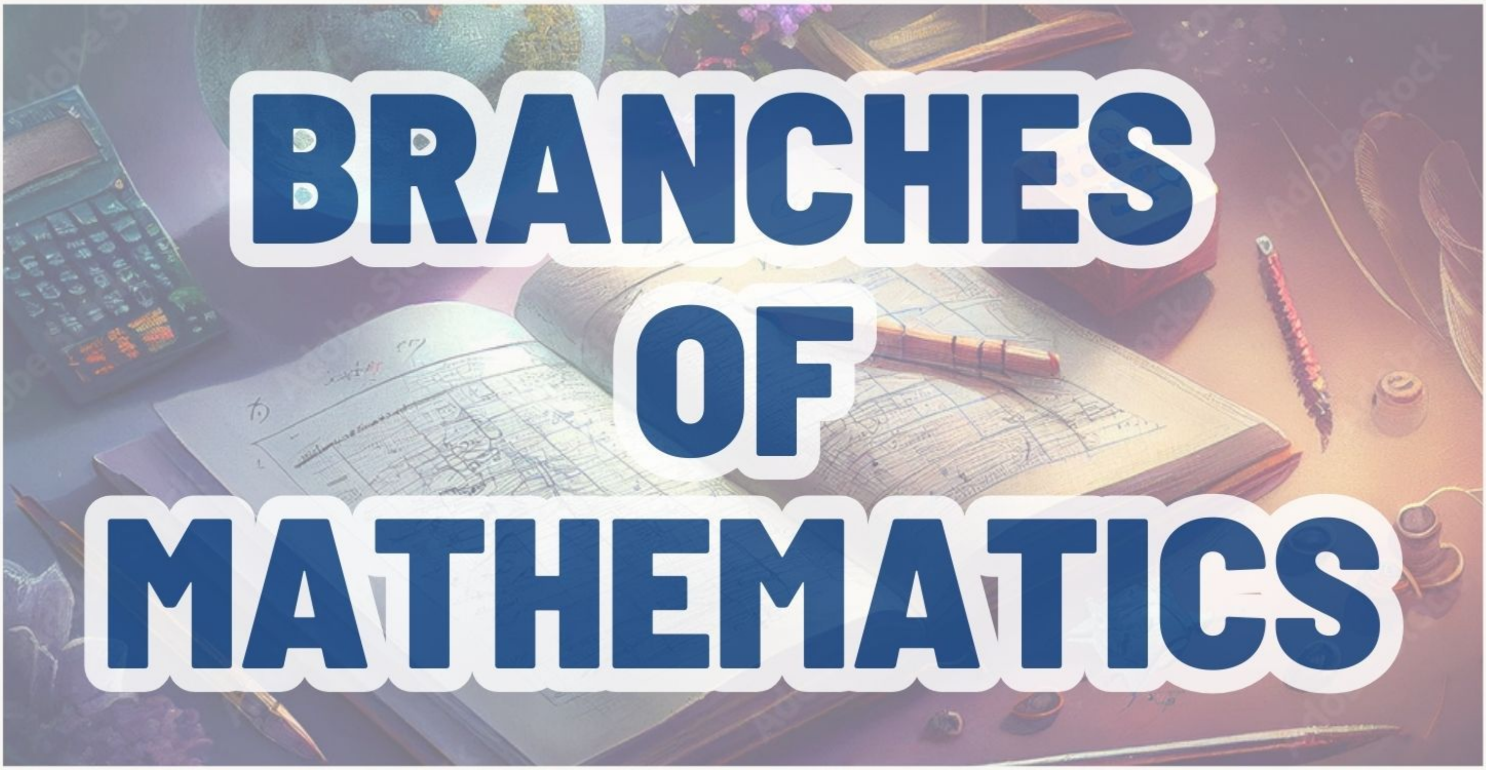

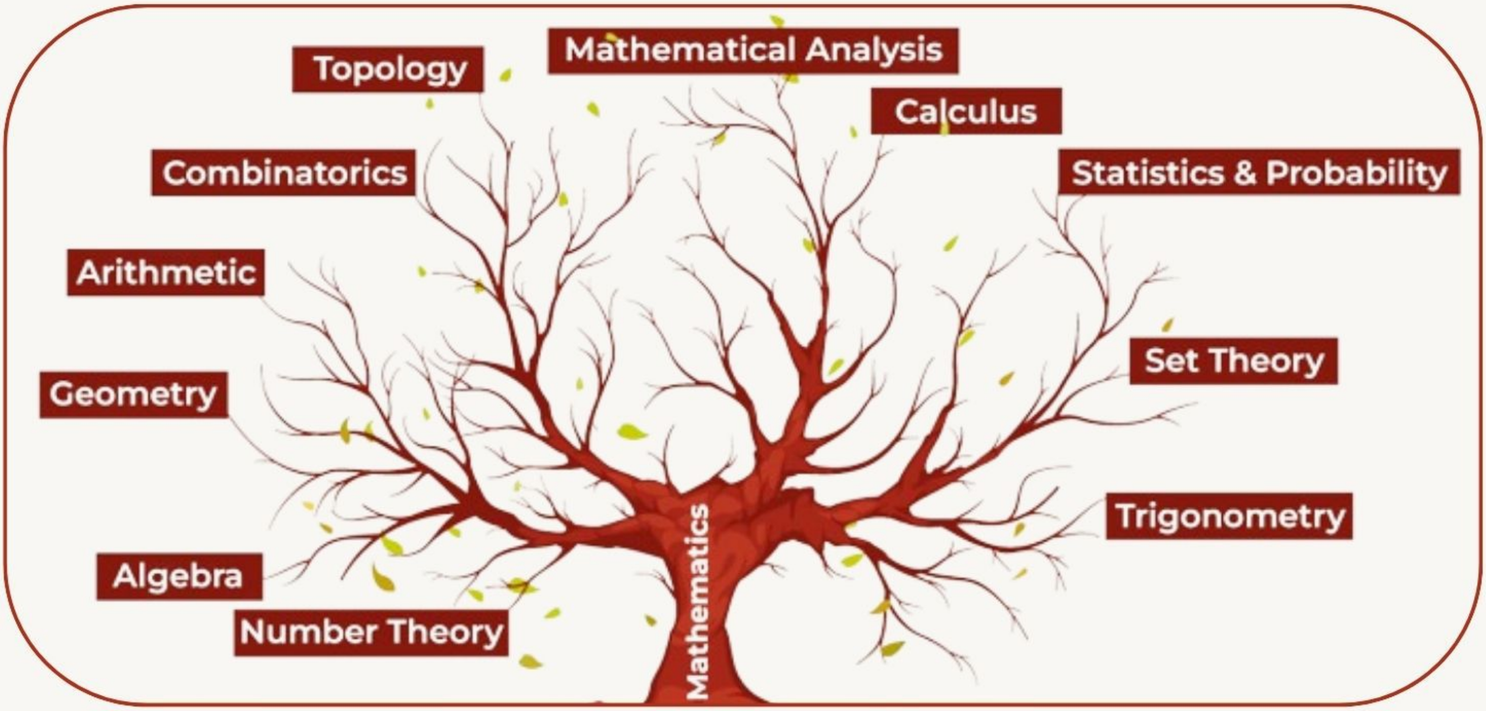

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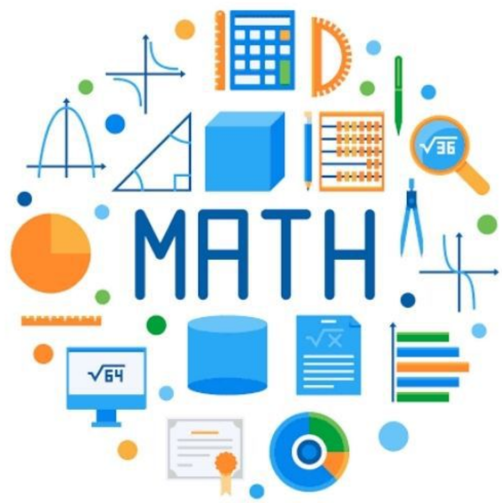
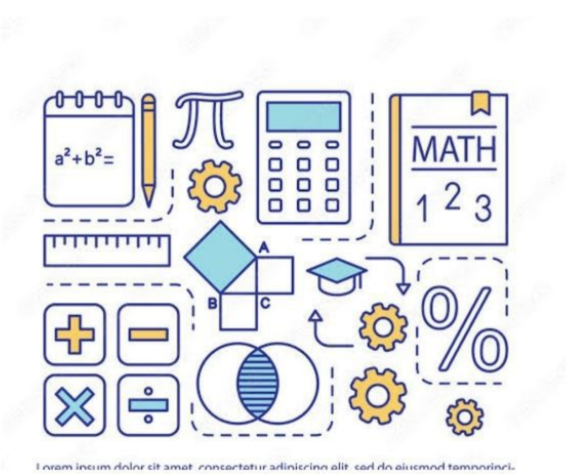
CAREERS IN MATHEMATICS

Statistician careers

Statisticians are specialists in statistics – that is, the collation, analysis, interpretation and presentation of statistics and quantitative data. Statisticians’ skills are required in numerous industries, ranging from healthcare to government and from finance to sport. You'll be tasked with managing, collecting and arranging data by means of surveys, experiments and contextual analysis. With your findings, you may then be called upon to create reports and advise clients/colleagues on possible strategies, for example in order to make good financial decisions to further business goals. As a statistician, you'll have expert analytical skills as well as solid communication and IT skills



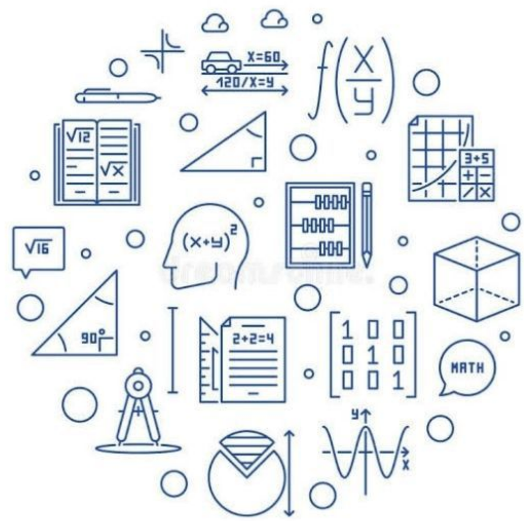


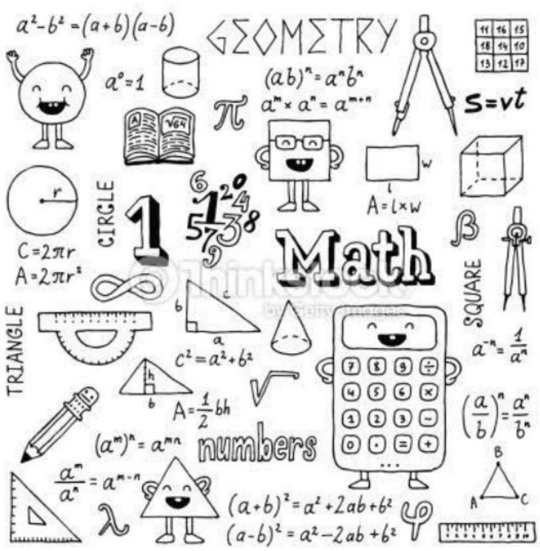
Careers in banking

Opportunities in banking range from the world of retail banking to corporate investment banking. Both arenas deal with financial assessment – public and private – with opportunities to specialize in areas such as mergers and acquisitions, bonds and shares, privatization, lending and IPOs (initial public offerings). Duties can include market research, creating new business opportunities, and developing financial models and solutions to present to clients. Math careers in banking can be lucrative, but, professional qualifications in finance will be needed for some roles.

Actuarial careers

As an actuary, you will be evaluating financial risk in order to manage and advise clients. Combining risk analysis skills with in-depth knowledge of economics and business, actuaries are at the heart of business strategy, ensuring sound investments are made and commercial/business goals fulfilled. New actuaries will most likely be working within pensions and insurance, a relatively low-risk area, while in the future you may get to work in banking, healthcare or investment. Actuarial roles can be client-facing, as with consultancies and pensions/insurance companies, and all actuaries will require the skill of communicating complex data and analyses to non-specialists.



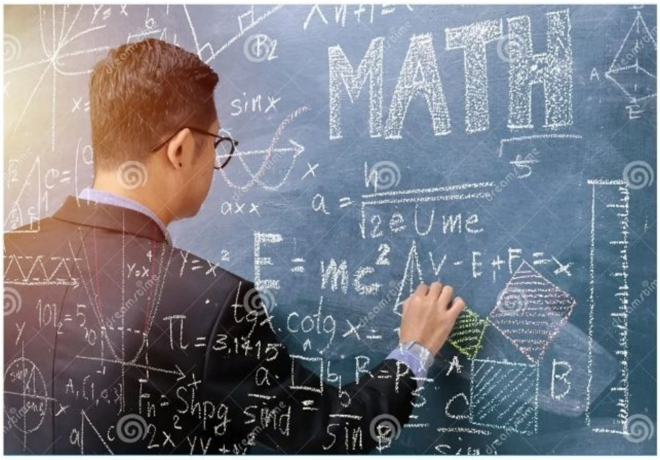


Careers in academia and research

While it's now clearly understood that careers in Maths go far beyond the realms of academia and research, these sectors are still very popular among Mathematics students. This route may appeal to those who want the challenge of driving forward the next series of discoveries, theories and applications of the field – as well as the prestige of following some of history's greatest Mathematical minds. Academic and research-based careers in Maths can be incredibly wide-ranging, and will depend on what area you wish to specialize in.

Teaching

In addition to academic roles with a research focus, many rewarding Maths careers can be found in teaching. Numeracy is always a high priority within primary and secondary education systems, making highly numerate graduates with an interest in teaching highly sought-after. In order to teach in most countries, you'll require a formal teaching qualification. To teach at university level, a postgraduate degree is often required, in a relevant specialism. If you choose this path, you may also get the chance to pursue your own academic research

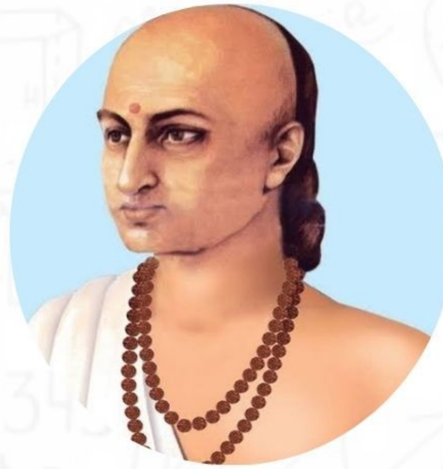


Other common Maths careers include; intelligence analysis, operational research, statistical research, logistics, financial analysis, market research (for business), management consultancy, IT (systems analysis, development or research), software engineering, computer programming, the public sector (advisory capacity as a scientist or statistician), scientific research and development (e.g. biotechnology, meteorology or oceanography). Numeracy, the ability to understand and work with numbers, is extremely sought after and high in demand.

FAMOUS MATHEMATICIAN

ARYABHATA

BHARAT,476 – 550 AD



Aryabhata was a child prodigy who excelled in maths and astronomy. Most of what is known about him today emanated from those who read his extinct publications. His masterpiece, titled Aryabhatiya, was published while he was in his early 20s. It is a four-chaptered treatise that houses magnificent works (in both maths and astronomy); and remains his only disquisition known to have survived.

In it are geocentric discourses which were the norm during his era, and which were deemed valid for another millennium, before being invalidated and replaced with heliocentrism. owever, his insinuation that the earth rotated on its axis daily, is correct. The same goes for his allusion that asterisms and the planets (along with their respective moons) glimmer due to reflected lights from sun. Despite losing most of his publications over the centuries, evidence abound: through references, citations, translations, etc.,

Srinivasa Ramanujan

BHARAT,1887-1920

This is the story of a mathematical prodigy and his proclivity towards the subject despite having a life of poverty and neglect. His amazing ability to understand messages and meaning lying in numbers and his genius andextraordinary brilliance in number theory and pattern of the number brought the focus of entire world towards India.

The effect that words have on a poet and emotions on a lyricist, was the same that the Principles of Mathematics had on S. Ramanujan. According to him-
“Mathematics is not about numbers, equations, computation or algorithms: it is about understanding."

Carl Friedrich Gauss

Germany, 1777–1855

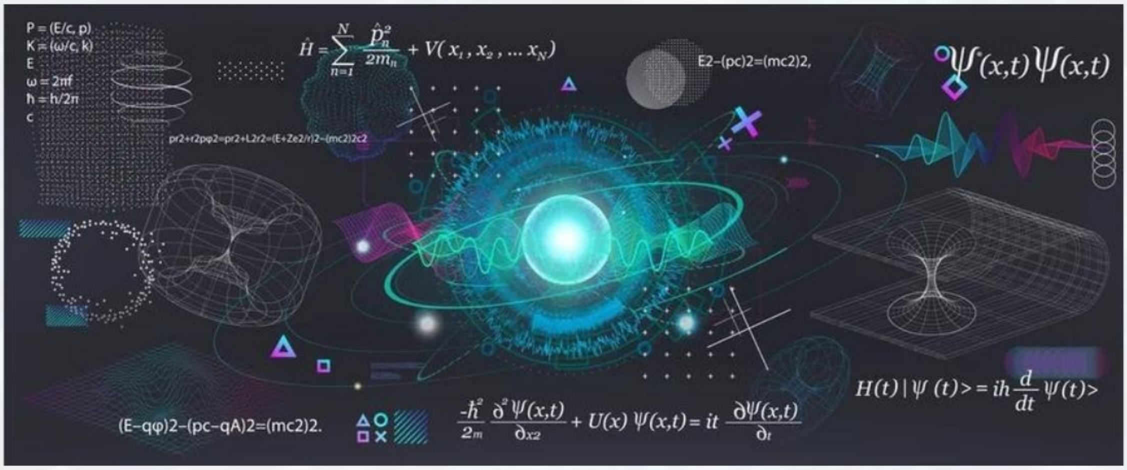
Gauss made contributions to number theory, geometry, probability theory, the theory of functions, and more. Because of the number of contributions he made to math, he has been called the Prince of Mathematics. Some of his contributions to number theory include the prime number theorem, the arithmetic/geometric mean, and the binomial theorem, among others. Gauss is quoted as saying, "Mathematics is the queen of the sciences, and number theory is the queen of mathematics."

Gauss graduated as a Doctor of Philosophy in 1799, not in Göttingen, as is sometimes stated, but at the Duke of Brunswick's special request from the University of Helmstedt, the only state university of the duchy.

Euclid

Egypt, 325–265 B.C..

If you've studied geometry, you've heard of Euclid. He was known as the Father of Geometry. Euclid's most famous work is The Elements, his writing about mathematics. It was the center of math instruction for 2,000 years. In The Elements, Euclid lays out five postulates that are the foundation of geometry.



Postulates one, two, and three are about lines, points, and circles. Postulate four states that all right angles are equal. Postulate five is about the nature of parallel lines. A lot of what Euclid did seems obvious to us now, but that's because Euclid laid it all out so other scholars could build on it.Very little is known of Euclid's life, and most information comes from the scholars Proclus and Pappus of Alexandria many centuries later

AREAS OF MATHEMATICS

Before the Renaissance, mathematics was divided into two main areas: arithmetic, regarding the manipulation of numbers, and geometry, regarding the study of shapes. Some types of pseudoscience, such as numerology and astrology, were not then clearly distinguished from mathematics.

During the Renaissance, two more areas appeared. Mathematical notation led to algebra which, roughly speaking, consists of the study and the manipulation of formulas. Calculus, consisting of the two subfields differential calculus and integral calculus, is the study of continuous functions, which model the typically nonlinear relationships between varying quantities, as represented by variables. This division into four main areas–arithmetic, geometry, algebra, calculus–endured until the end of the 19th century. Areas such as celestial mechanics and solid mechanics were then studied by mathematicians, but now are considered as belonging to physics.The subject of combinatorics has been studied for much of recorded history, yet did not become a separate branch of mathematics until the seventeenth century.

At the end of the 19th century, the foundational crisis in mathematics and the resulting systematization of the axiomatic method led to an explosion of new areas of mathematics. The 2020 Mathematics Subject Classification contains no less than sixty-three first-level areas. Some of these areas correspond to the older division, as is true regarding number theory (the modern name for higher arithmetic) and geometry. Several other first-level areas have "geometry" in their names or are otherwise commonly considered part of geometry. Algebra and calculus do not appear as first-level areas but are respectively split into several first-level areas. Other first-level areas emerged during the 20th century or had not previously been considered as mathematics, such as mathematical logic and foundations.

ALGEBRA

Algebra is the art of manipulating equations and formulas. Diophantus (3rd century) and al-Khwarizmi (9th century) were the two main precursors of algebra.[37][38] Diophantus solved some equations involving unknown natural numbers by deducing new relations until he obtained the solution. Al-Khwarizmi introduced systematic methods for transforming equations, such as moving a term from one side of an equation into the other side. The term algebra is derived from the Arabic word al-jabr meaning 'the reunion of broken parts' that he used for naming one of these methods in the title of his main treatise.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

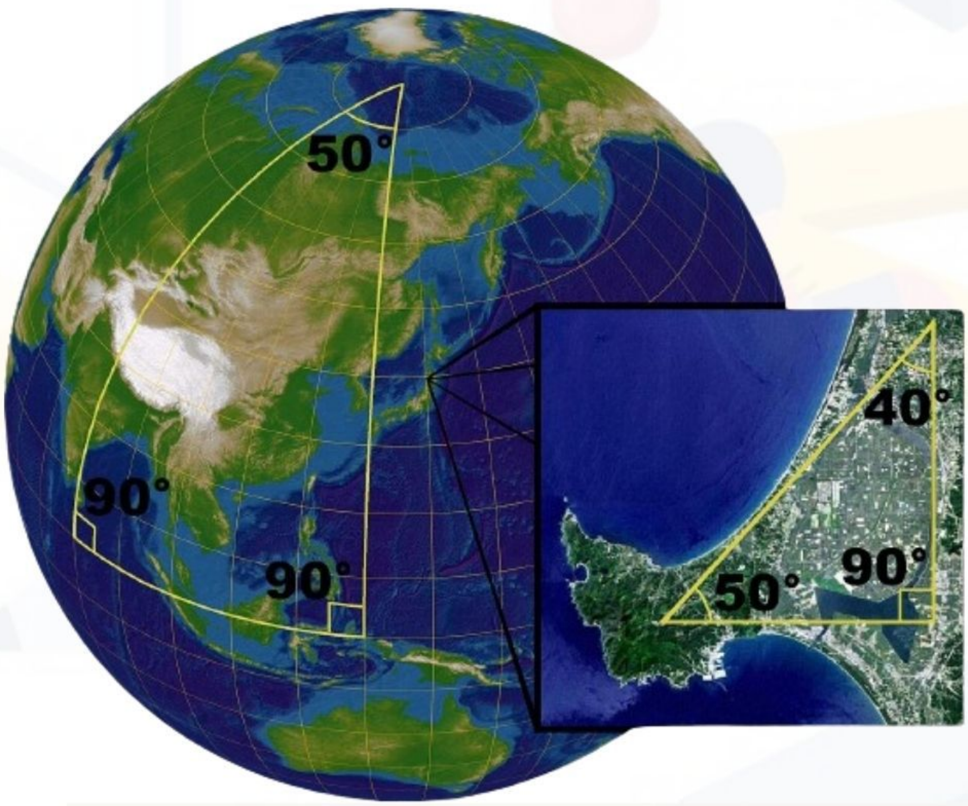
The quadratic formula, which concisely expresses the solutions of all quadratic equations

Algebra became an area in its own right only with François Viète (1540–1603), who introduced the use of variables for representing unknown or unspecified numbers. Variables allow mathematicians to describe the operations that have to be done on the numbers represented using mathematical formulas.

Until the 19th century, algebra consisted mainly of the study of linear equations (presently linear algebra), and polynomial equations in a single unknown, which were called algebraic equations (a term still in use, although it may be ambiguous). During the 19th century, mathematicians began to use variables to represent things other than numbers (such as matrices, modular integers, and geometric transformations), on which generalizations of arithmetic operations are often valid. The concept of algebraic structure addresses this, consisting of a set whose elements are unspecified, of operations acting on the elements of the set, and rules that these operations must follow. The scope of algebra thus grew to include the study of algebraic structures. This object of algebra was called modern algebra or abstract algebra, as established by the influence and works of Emmy Noether.

GEOMETRY

Geometry is one of the oldest branches of mathematics. It started with empirical recipes concerning shapes, such as lines, angles and circles, which were developed mainly for the needs of surveying and architecture, but has since blossomed out into many other subfields. A fundamental innovation was the ancient Greeks' introduction of the concept of proofs, which require that every assertion must be proved. For example, it is not sufficient to verify by measurement that, say, two lengths are equal; their equality must be proven via reasoning from previously accepted results (theorems) and a few basic statements. The basic statements are not subject to proof because they are self-evident (postulates), or are part of the definition of the subject of study (axioms). This principle, foundational for all mathematics, was first elaborated for geometry, and was systematized by Euclid around 300 BC in his book Elements.

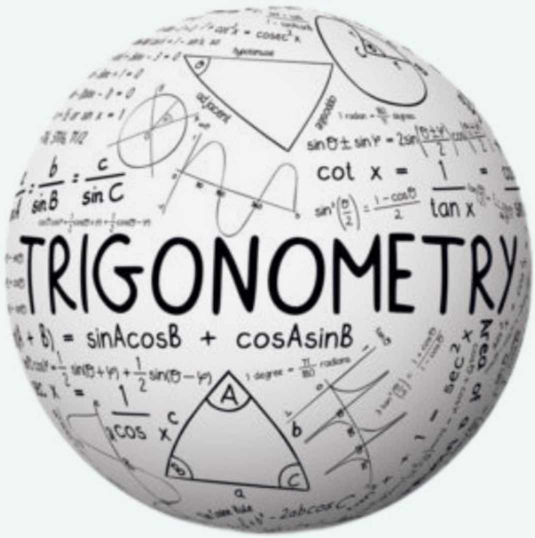


On the surface of a sphere, Euclidean geometry only applies as a local approximation. For larger scales the sum of the angles of a triangle is not equal to 180°.

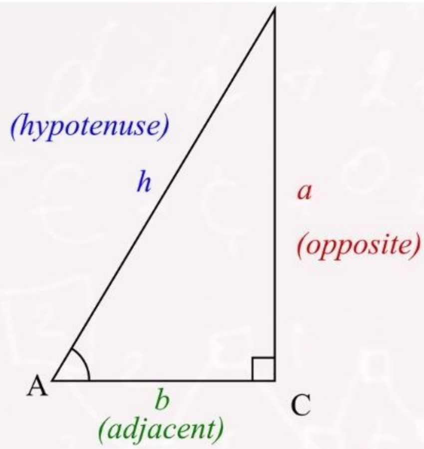
TRIGONOMETRY

Sumerian astronomers studied angle measure, using a division of circles into 360 degrees. [8] They, and later the Babylonians, studied the ratios of the sides of similar triangles and discovered some properties of these ratios but did not turn that into a systematic method for finding sides and angles of triangles. The ancient Nubians used a similar method.

In the 3rd century BC, Hellenistic mathematicians such as Euclid and Archimedes studied the properties of chords and inscribed angles in circles, and they proved theorems that are equivalent to modern trigonometric formulae, although they presented them geometrically rather than algebraically. In 140 BC, Hipparchus (from Nicaea, Asia Minor) gave the first tables of chords, analogous to modern tables of sine values, and used them to solve problems in trigonometry and spherical trigonometry. In the 2nd century AD, the Greco-Egyptian astronomer Ptolemy (from Alexandria, Egypt) constructed detailed trigonometric tables (Ptolemy's table of chords) in Book 1, chapter 11 of his Almagest. Ptolemy used chord length to define his trigonometric functions, a minor difference from the sine convention we use today. (The value we call sin(θ) can be found by looking up the chord length for twice the angle of interest (2θ) in Ptolemy's table, and then dividing that value by two.) Centuries passed before more detailed tables were produced, and Ptolemy's treatise remained in use for performing trigonometric calculations in astronomy throughout the next 1200 years in the medieval Byzantine, Islamic, and, later, Western European worlds.



TRIGONOMETRIC RATIOS



Trigonometric ratios are the ratios between edges of a right triangle. These ratios depend only on one acute angle of the right triangle, since any two right triangles with the same acute angle are similar.

- **Sine (denoted sin), defined as the ratio of the side opposite the angle to the hypotenuse.**

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{a}{h}.$$

- **Cosine (denoted cos), defined as the ratio of the adjacent leg (the side of the triangle joining the angle to the right angle) to the hypotenuse.**

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{b}{h}.$$

- **Tangent (denoted tan), defined as the ratio of the opposite leg to the adjacent leg.**

$$\tan A = \frac{\text{opposite}}{\text{adjacent}} = \frac{a}{b} = \frac{a/h}{b/h} = \frac{\sin A}{\cos A}$$

ACTIVITY

This is a crossword puzzle without words -- numbers are the answers instead (a single digit for each square in the grid). Unlike a crossword puzzle, deductive logic based on a knowledge of Math is needed to work out the an- swers from information provided in the clues. A little trial and error solving may also be necessary. (Bold black lines in the puzzle grid separate entries in the same way as black squares.) Additional clue: there are no zeros in the completed grid.

ACROSS

1 The first two digits are a prime number; the second two are the next lower prime number

5 A perfect cube

6 A multiple of the cube root of 4 DOWN; sum of digits is 6

8 The sum of the first two digits equals the sum of the last two digits equals the middle digit

9 A perfect cube

11 The square of the cube root of 4 DOWN

12 The product of 10 DOWN times 6 ACROSS

DOWN

1 A number in which each digit is one lower than the pre- ceding digit

2 The sum of the digits is two-thirds the product of the digits

3 The product of three primes; the first 10 larger than the second;
the second 10 larger than the third

4 A perfect cube

7 All even digits; each different

9 A perfect cube

10 A prime number

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AARYA BHATT MANDAL

MATHS LAB

The mathematics laboratory is a place where anybody can experiment and explore teaching and learning material. It is a place where one can find a collection of games, puzzles, and etc.

The materials are meant to be used both by the students on their own and with their teacher to explore the world of mathematics, to discover, to learn and to develop an interest in mathematics. The activities create interest among students or in anybody who wants to explore, and test some of their ideas, beliefs about mathematics.

The activities in the maths lab should be appealing to a wide range of people, of different ages and varying mathematical proficiency. While the initial appeal is broad-based, the level of engagement of different individuals may vary. The maths lab activities listed here have been done with students and teachers of different grade levels.

The maths lab provides an opportunity for the students to discover mathematics through doing. Many of the activities present a problem or a challenge, with the possibility of generating further challenges and problems. The activities help students to visualize, manipulate and reason. They provide opportunity to make conjectures and test them, and to generalize observed patterns. They create a context for students to attempt to prove their conjectures.

Some of the ways in which a Mathematics Laboratory can contribute to the learning of the subject are:

- It provides an opportunity to students to understand and internalize the basic mathematical concepts through concrete objects and situations.
- It enables the students to verify or discover several geometrical properties and facts using models or by paper cutting and folding techniques.
- It helps the students to build interest and confidence in learning the subject.
- The laboratory provides opportunity to exhibit the relatedness of mathematical concepts with everyday life.
- It provides greater scope for individual participation in the process of learning and becoming autonomous learns.
- The laboratory allows and encourages the students to think, discuss with each other and the teacher and assimilate the concepts in a more effective manner.
- It enables the teacher to demonstrate, explain and reinforce abstract mathematical ideas by using concrete objects, models, charts, graphs, pictures, etc.

MATHS LAB ACTIVITY

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