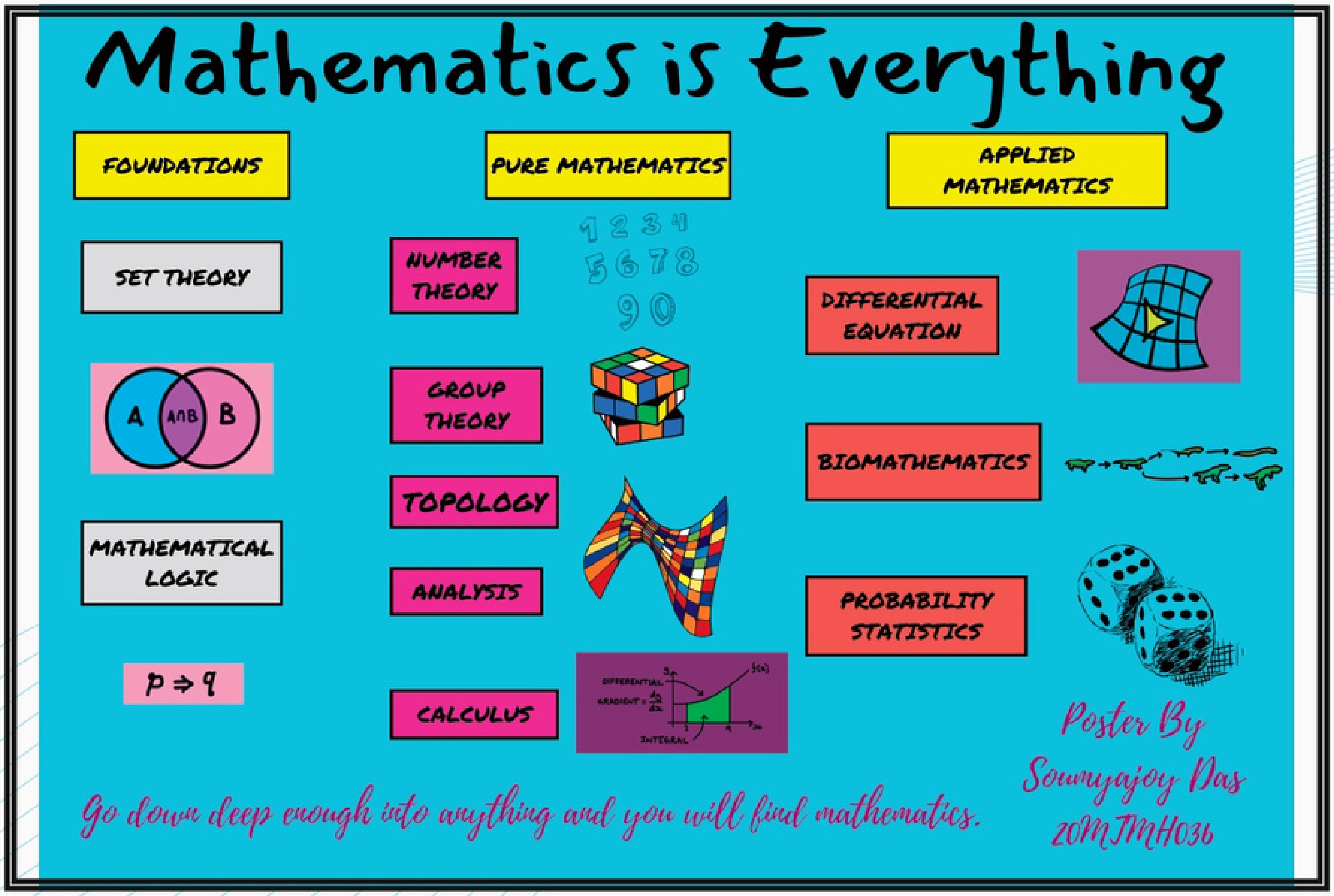
INTEGRATION

The Mathematics E-Newsletter 2022-23



Department of Mathematics
Durgapur Government College
Durgapur-713214

Dr. Debnath Palit

Dear Readers,

It is a matter of great pleasure to know that the Department of Mathematics come up with the first edition of, INTEGRATION, The Mathematics Newsletter 2022-23, which will serve as a promising window for the students to evolve their creativity, subject expertise and portrayal of their thoughts with confidence. We aim to nurture young individuals to confidently and competently face the challenges of the intensifying competitive world beyond the curricular activities.

I acknowledge the sincere team of work of the students and faculty members of the Department of Mathematics, who took the initiative to contribute their stimulated thoughts and skills in the completion of this piece of interesting work.

Best wishes for the success of INTEGRATION, The Mathematics Newsletter 2022-2023

FROM THE HEAD OF DEPARTMENT

Welcome to the Department of Mathematics, Durgapur Government College! We, the department of Mathematics feel our enthusiasm for the first publication of our departmental newsletter "INTEGRATION". It gives me great pleasure to congratulate all the faculty members and the students for their limitless support and sincere efforts for the betterment and development of the department as well as for innovation occurring in the department.

I express my sincere thanks to the Principal for his constant encouragement and guidance for every academic activity of the teachers and the students.

I hope this newsletter will motivate the teachers and the students of sharing their creativity and new ideas with the world. On this occasion, I congratulate all the team members of the editorial board for bringing up this issue in a better shape and also I wish the best of luck for the Publication of the newsletter.

Prof. Amitava Samanta
Head
Department of Mathematics
Durgapur Government College

ABOUT OUR DEPARTMENT

Our department of Mathematics is an important academic part of the college offering B.Sc. Honours and B.Sc courses successfully. The main aim of our department is to Create Deep Interest in learning mathematics and enhance the ability of learners to apply knowledge and skills acquired by them during the programme to solve specific theoretical and applied problems in mathematics.

TEACHING FACULTY

- Prof. Amitava Samanta (HOD)
- Dr. Pratikshan Mondal
- Prof. Sibaji Rit
- Dr. Amiya Biswas
- Prof. Soumendu Nandy

MESSAGE FROM STUDENTS FOR TEACHERS

Thank you for all your help. I know a lot of people think it is just your job to help, but we can tell that you actually care about us and whether we understand what you are teaching. We know that many of us had trouble understanding mathematics, but you never gave up on trying to teach us and making sure that we understand it. You made mathematics very much interesting to learn.

Report of One Day Workshop on "Basics in Excel and Its Applications"(DBT STAR COLLEGE SCHEME) 20th January 2023 organized by the Department of Mathematics, Durgapur Government College

A One Day Workshop on "Basics in Excel and Its Applications" under DBT STAR COLLEGE SCHEME was organized by the Department of Mathematics on 20th January 2023 (Friday). The workshop was started with a welcome address by Prof Amitava Samanta, H.O.D., Department of Mathematics, Durgapur Government College. The inaugural speech by Dr. Pratikshan Mondal, Assistant Professor of Mathematics, Durgapur Government College followed the welcome address. The whole session on the basics of MS-Excel was presented by Prof. Sibaji Rit, Assistant Professor of Mathematics, Durgapur Government College. Twenty-eight students from various departments of Chemistry, Botany, Zoology, and Mathematics have participated in the workshop. This workshop intends to provide students with knowledge on using Excel to analyze several types of data, including values, series, and formulas. The workshop concluded with a vote of thanks by Prof Amitava Samanta, H.O.D., Department of Mathematics.

Everything which is beautiful is not true, truth can be ugly. But mathematics is a beautiful truth

Math is the only place where truth and beauty mean the same thing

~Danica Mckellar

No matter how much subjective beauty is, we all seek for beauty in everything. As beauty is subjective this can't be true every time. Mathematics is one of the rarest example of beautiful truth. Math requires logical thinking and a rational mind. And a rational mind always speaks fact.

Quote analysis

Beauty in mathematics is seeing truth without effort

While the beauty of maths portrayed in almost every aspect of maths very often. Sometimes it is not so much interesting and sometimes it is hard as hell. Mathematics is our that friend who always show us the mirror, whether we like it or not. This kind of friend is harsh, outspoken may be rude sometimes just like maths. But we all need that friend in our life who choose to be true to us, no matter how much hard it is. And this type of friend is always beautiful to have.

Article by Suvam Mondal
20MJMH015

Cryptography is the science of using mathematics and computer science to hide data behind encryption. This includes storing secret information along with the keys needed to access raw data. There is no way to know what the source is without breaking the code. The sender encrypts the information and the recipient decrypts it.

Cryptography is also used in data security science, but cryptanalysis is also important for understanding the mathematical aspects of data encryption and decryption. Cryptography requires a combination of mathematical tools, pattern finding, analytical thinking, decisions, and small changes. Cryptanalyst is a term commonly used to refer to someone who attacks systems and finds vulnerabilities.

Cryptography is an amazing field of mathematics and is used most often in our daily life.

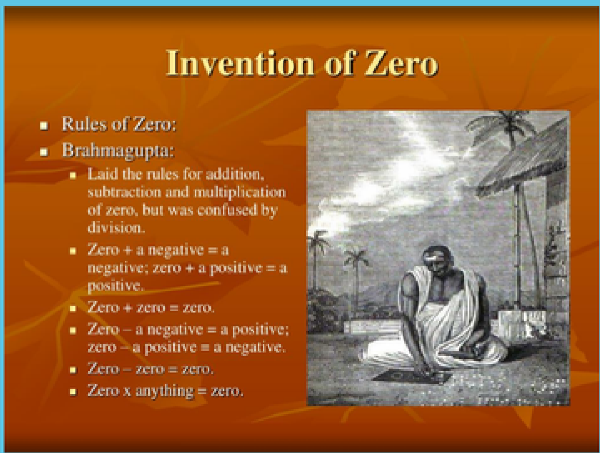
Article by Soumyajoy Das
20MJMH036

Mathematics goes beyond the real world but the real world is ruled by it. Mathematics is a universal language. It does not matter where you are. One of the most important topic in this era is Financial mathematics which focuses on applying mathematical formulas and equations to financial problems, market modeling and data analysis.

Financial mathematics mainly uses the modern mathematical theory and method (such as portfolio analysis, multivariate statistical analysis, mathematical programming etc.) of financial (including banking, investment, bonds, funds, stocks, futures, options and other financial instruments and markets) analysis the number of theory and practice. Till here mathematics affects the financial decisions that we make every day like paying bill, at grocery etc. Thus it plays a vital role in our daily life.

Article by Payal Mishra
20MJMH040

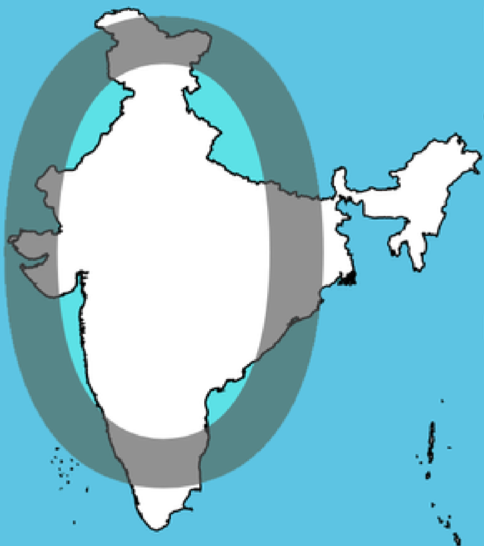
CONCEPT of ZERO



LIfe without zero

Having no zero would unleash utter chaos in the world. Maths would be different ball game altogether, with no fractions, no algebra and no calculus. A number line would go from -1 to 1 with nothing bridging the gap. Zero as a placeholder has lots of value and without it a billion would simply be "1". It would mean no computers. Now to imagine our world without a computer is super hard, on top of that no mobile phones or tablets is beyond imagination.

INDIAN ZERO



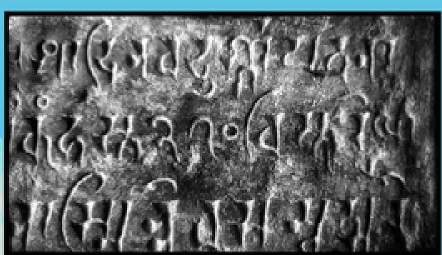
Indian zero was not a mere place holder, it was a number in its own right it is a solution to an algebraic equation like:

$$x+3=3$$

$$(x=0)$$

Bramhagupta discussed the properties of zero the number and Bhaskara II worked out the rules

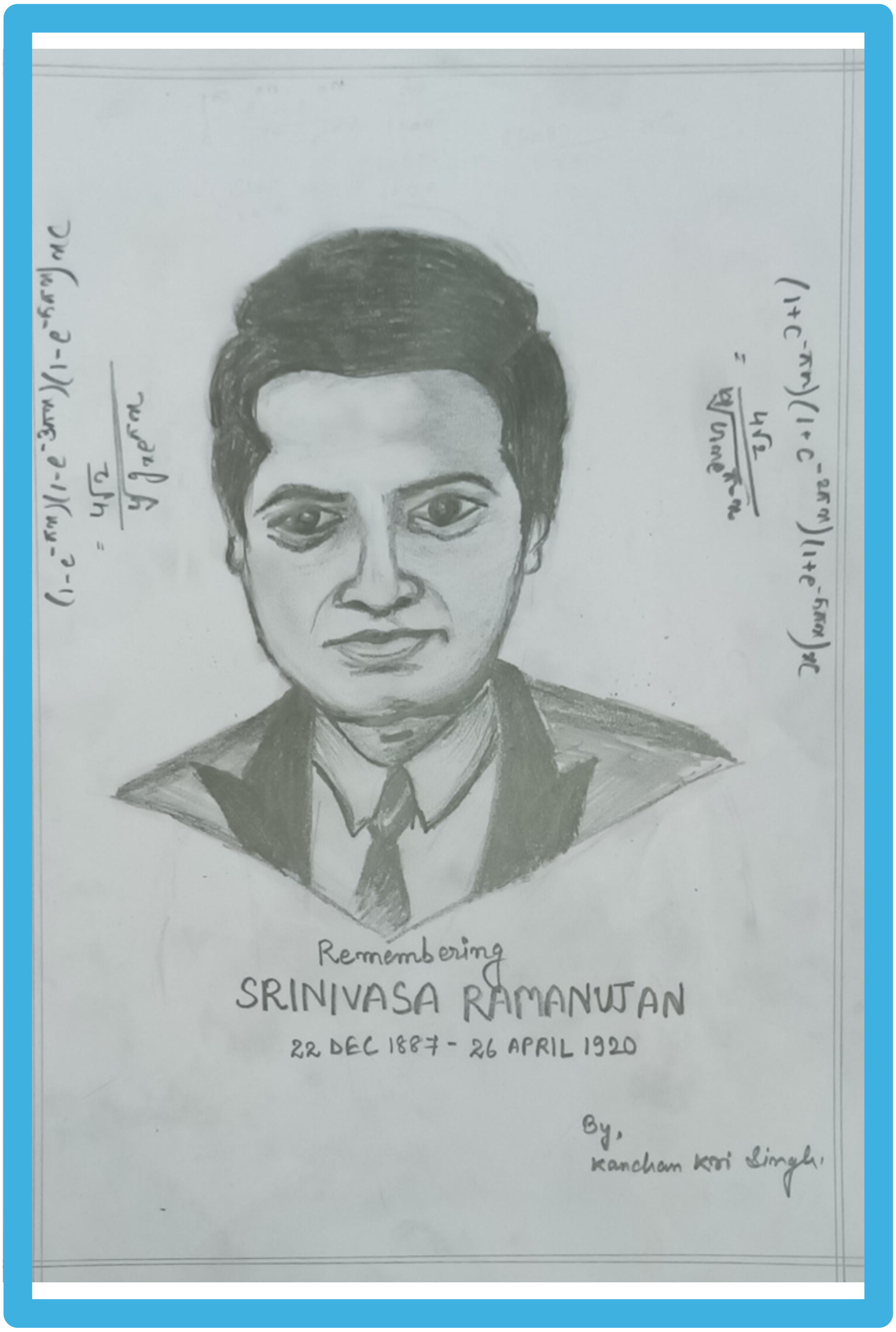
EPIGRAPHICAL EVIDENCE OF ZERO IN INDIA



Earliest epigraphically evidence of zero in India is found in a small vishnu temple in the Gwalior fort dating back to 876 CE.

Just inside the inner chamber, on Vishnu's right hand side, is the dedication tablet. the tablet records the date(in local era started in 57 BCE), dimension of a land granted to a neighbouring temple.

Article by Kanchan Kumari Singh
20MJMH039



Drawing by Kanchan Kumari Singh
20MJMH039

SRINIVASA RAMANUJAN: A GREAT MATHEMATICIAN

Srinivasa Ramanujan at Cambridge

Srinivasa Ramanujan (1887-1920), the man who reshaped twentieth-century mathematics with his various contributions in several mathematical domains, including *mathematical analysis, infinite series, continued fractions, number theory,* and *game theory* is recognized as one of history's greatest mathematicians. Surprisingly, he never received any formal mathematics training. Most of his mathematical discoveries were based only on intuition and were ultimately proven correct. Every year, Ramanujan's birth anniversary on **December 22** is observed as **National Mathematics Day**.

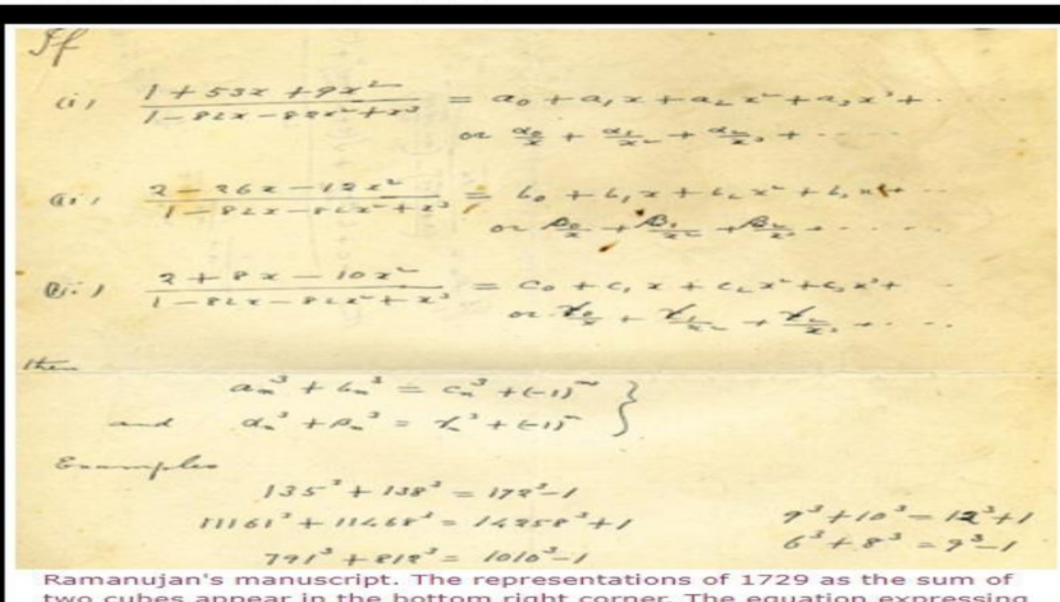
Untrained; self-taught; genius- these are some of the adjectives that were used to describe Ramanujan's brief, but incredible life. **Srinivasa Aiyangar Ramanujan** was born December 22, 1887 in the city of Erode, in his grandmother's house. Just like his other two siblings, Srinivasa also almost lost his life at an early age. At the age of five, Ramanujan contracted smallpox. However, he was able to recover from the disease, considering his family had no money to spend on medical expenses. This was uncommon, since many of the children were also contracting smallpox and dying from it. This early disease may have weakened his body to fight disease, which may have been the reason why he died so early. Although Ramanujan's family was poor, they were respectable because of his grandmother, who was a minor official in a local court. This level of respect in the family is what allowed Ramanujan to attend school. What's more, Ramanujan's family used their house to room international students, which is how Ramanujan was introduced to higher-level mathematics at a young age when he received a mathematics book from one of the rooming students.

During his short life, Ramanujan independently compiled nearly **3,900** results (mostly identities and equations). Many were completely novel; his original and highly unconventional results, such as **the Ramanujan prime**, **the Ramanujan theta function**, **partition formulae** and **mock theta functions**, have opened entire new areas of work and inspired a vast amount of further research. Of his thousands of results, all but a dozen or two have now been proven correct. **The Ramanujan Journal**, a scientific journal, was established to publish work in all areas of mathematics influenced by Ramanujan, and his notebooks—containing summaries of his published and unpublished results—have been analysed and studied for decades since his death as a source of new mathematical ideas. As late as 2012, researchers continued to discover that mere comments in his writings about "simple properties" and "similar outputs" for certain findings were themselves profound and subtle number theory results that remained unsuspected until nearly a century after his death. He became one of the youngest **Fellows of the Royal Society** and only the second Indian member, and the first Indian to be elected a Fellow of Trinity College, Cambridge. Of his original letters, Hardy stated that a single look was enough to show they could have been written only by a mathematician of the highest calibre, comparing Ramanujan to mathematical geniuses such as Euler and Jacobi.

Ramanujan's major contributions to mathematics:

Ramanujan's contribution extends to mathematical fields such as complex analysis, number theory, infinite series, and continued fractions.

- ✓ **Infinite series for pi:** In 1914, Ramanujan found a formula for *infinite series for pi,* which forms the basis of many algorithms used today. Finding an *accurate approximation of π (pi)* has been one of the most important challenges in the history of mathematics.
- ✓ **Game theory:** Ramanujan discovered a long list of new ideas for solving many challenging mathematical problems that have given great impetus to the development of game theory.
- ✓ **Mock theta function:** He elaborated on the mock theta function, a concept in the field of modular forms of mathematics.
- ✓ **Ramanujan number:** 1729 is known as the **Ramanujan number** which is the sum of the cubes of two numbers 10 and 9.



Ramanujan's manuscript. The representations of 1729 as the sum of two cubes appear in the bottom right corner. The equation expressing the near counter examples to Fermat's last theorem appears further up: $\alpha^3 + \beta^3 = \gamma^3 + (-1)^n$. Image courtesy Trinity College library. Click

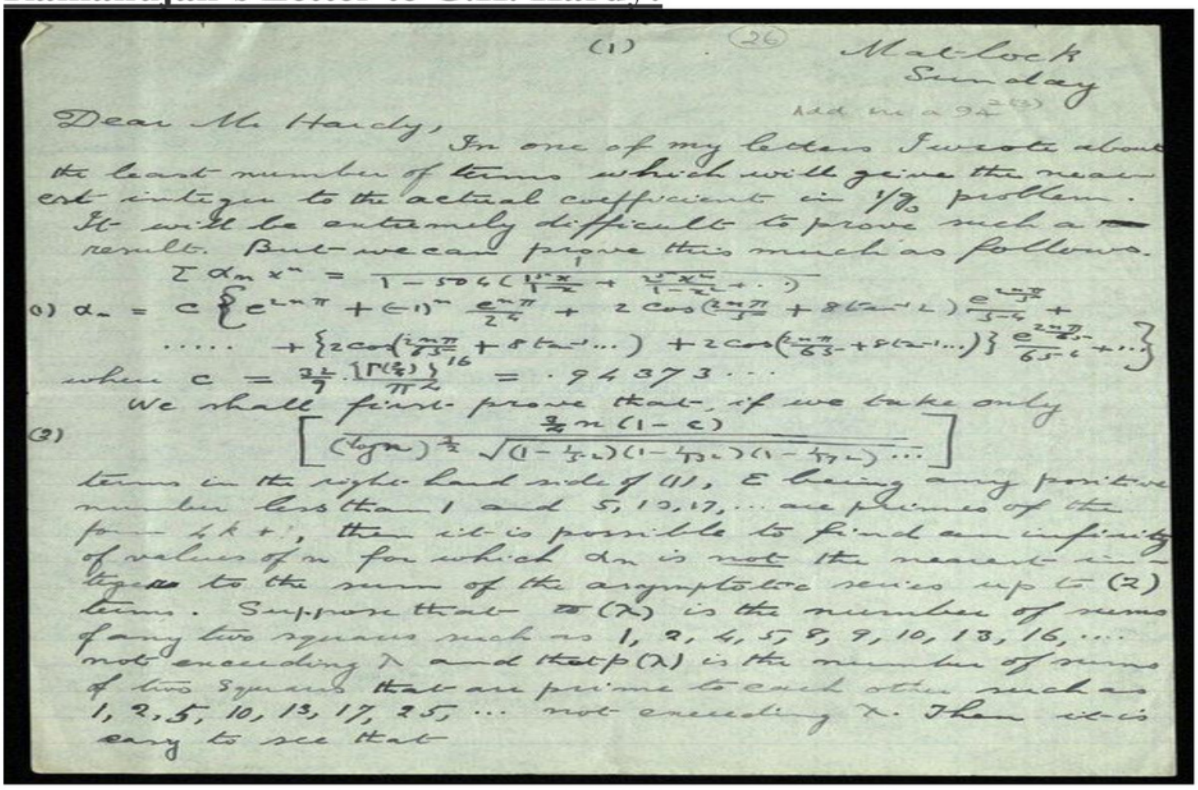
- ✓ **Circle Method:** Ramanujan, along with G.H. Hardy, invented the circle method which gave the first approximations of the partition of numbers beyond 200. This method contributed significantly to solving the notorious complex problems of the 20th century, such as Waring's conjecture and other additional questions.
- ✓ **Theta Function:** Theta function is a special function of several complex variables. German mathematician Carl Gustav Jacob Jacobi invented several closely related theta functions known as Jacobi theta functions. Theta function was studied by extensively Ramanujan who came up with the Ramanujan theta function, that generalizes the form of Jacobi theta functions and also captures general properties. Ramanujan theta function is used to determine the critical dimensions in Bosonic string theory, superstring theory, and M-theory.

Other notable contributions by Ramanujan include *hypergeometric series, the Riemann series, the elliptic integrals, the theory of divergent series, and the functional equations of the zeta function.*

Ramanujan's achievements were all about elegance, depth, and surprise beautifully intertwined. Unfortunately, Ramanujan contracted a fatal illness in England in 1918. He convalesced there for more than a year and returned to India in 1919. His condition then worsened, and he died on **26 April 1920**. One might expect that a dying man would stop working and await his fate. However, Ramanujan spent his last year producing some of his most profound mathematics.

It has been more than a century, however, his mathematical discoveries are still alive and flourishing. "Ramanujan is important not just as a mathematician but because of what he tells us that the human mind can do". "Someone with his ability is so rare and so precious that we can't afford to lose them. A genius can arise anywhere in the world. It is our good fortune that he was one of us. It is unfortunate that too little of Ramanujan's life and work, esoteric though the latter is, seems to be known to most of us".

Ramanujan's Letter to G.H. Hardy:



(1) (26) Matlock
Sunday

Dear Mr Hardy,
In one of my letters I wrote about the least number of terms which will give the nearest integer to the actual coefficient in 1/θ₀ problem. It will be extremely difficult to prove such a result. But we can prove this much as follows.

$$\sum \alpha_n x^n = \frac{1}{1 - 504\left(\frac{1^5 x}{1-x} + \frac{2^5 x^2}{1-x^2} + \cdots\right)}$$

(1) $\alpha_n = c\left\{e^{2n\pi} + (-1)^n \frac{e^{n\pi}}{2^4} + 2\cos\left(\frac{2n\pi}{3} + 8\tan^{-1}2\right)\frac{e^{\frac{2n\pi}{5}}}{5^4} + \cdots + \left\{2\cos\left(\frac{2n\pi}{65} + 8\tan^{-1}\cdots\right) + 2\cos\left(\frac{2n\pi}{65} + 8\tan^{-1}\cdots\right)\right\}\frac{e^{\frac{2n\pi}{65}}}{65^4} + \cdots\right\}$

where $c = \frac{32}{7}\cdot\frac{\{\Gamma(\frac{1}{4})\}^{16}}{\pi^2} = \cdot 94373\cdots$

We shall first prove that, if we take only

(2) $$\left[\frac{\frac{3}{4}n(1-\epsilon)}{(\log n)^{\frac{3}{2}}\sqrt{(1-\frac{1}{5^2})(1-\frac{1}{13^2})(1-\frac{1}{17^2})\cdots}}\right]$$

terms in the right hand side of (1), ε being any positive number less than 1 and 5, 13, 17, ... are primes of the form 4k+1, then it is possible to find an infinity of values of n for which αn is not the nearest integer to the sum of the asymptotic series up to (2) terms. Suppose that ϖ(x) is the number of sums of any two squares such as 1, 2, 4, 5, 8, 9, 10, 13, 16, ... not exceeding x and that p(x) is the number of sums of two squares that are prime to each other such as 1, 2, 5, 10, 13, 17, 25, ... not exceeding x. Then it is easy to see that

Biographical links

- Srinivasa Ramanujan at the Mathematics Genealogy Project
- *O'Connor, John J.; Robertson, Edmund F., "Srinivasa Ramanujan", MacTutor History of Mathematics archive, University of St Andrews*
- *Weisstein, Eric Wolfgang (ed.). "Ramanujan, Srinivasa (1887–1920)". ScienceWorld.*
- A short biography of Ramanujan
- "Our Devoted Site for Great Mathematical Genius"

Other links

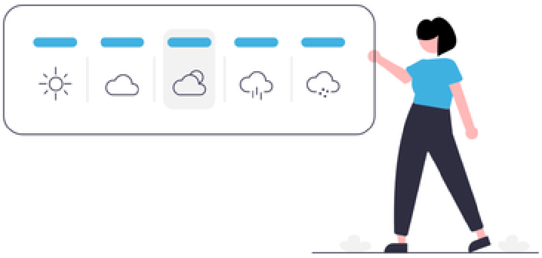
- *Wolfram, Stephen (27 April 2016). "Who Was Ramanujan?".*
- A Study Group For Mathematics: Srinivasa Ramanujan Iyengar
- *The Ramanujan Journal* – An international journal devoted to Ramanujan
- International Math Union Prizes, including a Ramanujan Prize
- Hindu.com: Norwegian and Indian mathematical geniuses, Ramanujan – Essays and Surveys Archived 6 November 2012 at the Wayback Machine, Ramanujan's growing influence, Ramanujan's mentor
- Hindu.com: The sponsor of Ramanujan
- *Bruce C. Berndt; Robert A. Rankin (2000). "The Books Studied by Ramanujan in India". American Mathematical Monthly. **107** (7): 595–601. doi:10.2307/2589114. JSTOR 2589114. MR 1786233.*
- "Ramanujan's mock theta function puzzle solved"
- Ramanujan's papers and notebooks
- Sample page from the second notebook
- Ramanujan on *Fried Eye*
- *Clark, Alex. "163 and Ramanujan Constant". Numberphile. Brady Haran. Archived from the original on 4 February 2018. Retrieved 23 June 2018.*
- https://www.indiascienceandtechnology.gov.in/listingpage/ramanujan-man-who-knew-infinity#:~:text=Ramanujan's%20contribution%20extends%20to%20mathematical,of%20many%20algorithms%20used%20today.
- https://en.wikipedia.org/wiki/Srinivasa_Ramanujan

In real life situation we mostly face struggles and competitions. In many practical problems having competitive situations where, there are two or more opponent parties with conflicting interests, it requires decision making and in these problems the actions to be taken by one depends upon the action taken by the other, called opponent. This competitive situation is called a Game.

Chess is an excellent example. We have all played the popular game chess at least once in our life. It depends upon the players, how they use the moves to checkmate the opponent. The rules of the game are known to both the players and have remained mostly unchanged which makes the game perfect example of application of Game Theory.

Article by Soumyajoy Das
20MJMH036

Weather forecasts are never 100% certain, as you will see when you look at you weather app. Rather than telling you that it's definitely going to rain or not, it'll tell you a percentage chance. For example, at this very moment my app says the chance of rain today is only 10%.



To see how meteorologists work out these chances, we first need to revisit an old friend, the famous butterfly effect. Meteorologists use mathematical models that can simulate the weather to make their forecast. To start off a simulation they need to measure the current values of things like temperature and pressure and feed these to the model. The butterfly effect means that a small inaccuracy in the starting values fed to the model can grow as the model runs through all the calculations necessary to make the forecast. This means that the forecast you get as the output can end up being very inaccurate.

Ensemble forecasting is one way of dealing with this problem. Rather than running the weather model just once, meteorologists run it many times, each time with slightly different values for the starting conditions. This gives them a whole ensemble of forecasts. If all these forecasts are very similar, then that means the butterfly effect isn't too pronounced and you can be quite certain the forecasts are accurate. If the forecasts vary widely, then you know that you can't be too certain.

The ensemble of forecasts also gives you the percentage chance you see in your app. If only 10% of the forecasts in the ensemble say that it'll rain, then that's the 10% you see on the app.

Ensemble forecasting was pioneered by the climate scientist Tim Palmer, and can be used in other situations too, for example when forecasting the behavior of a pandemic.

Article by Sonia Das
20MJMH019

"Here lies Diophantus,' the wonder behold.
Through art algebraic, the stone tells how old:
'God gave him his boyhood one-sixth of his life,
One twelfth more as youth while whiskers grew rife;
And then yet one-seventh ere marriage begun;
In five years there came a bouncing new son.
Alas, the dear child of master and sage
After attaining half the measure of his father's life chill fate took him. After consoling his fate by the science of numbers for four years, he ended his life."

-From puzzle no. 142 in Professor Layton and Pandora's Box

This puzzle implies that Diophantus' age x can be expressed as
$x = x/6 + x/12 + x/7 + 5 + x/2 + 4 = 84$ years

Diophantus of Alexandria (born c. AD 200–c.214; died c. AD 284–c.298) was an Alexandrian mathematician, who was the author of a series of books called Arithmetica, many of which are now lost. His texts deal with solving algebraic equations. Diophantine equations, Diophantine geometry and Diophantine approximations are some of the subareas of Number theory that are named after him.

Article by Ankita Mondal
20MJMH017

ARITHMETICA is a series of thirteen books out of which only 6 survived to date. It is a collection of problems having numerical solutions of both determinate and indeterminate equations. The method for solving these equations is known as Diophantine analysis. His equations are usually algebraic equations having integer coefficients for which there exist integer solutions. He was the first one who used mathematical notations, abbreviations for the power of numbers, and relationships and operations that is now known as Syncopated algebra. Before this, everyone used complete equations, which was very lengthy and time-consuming. So, his introduction of symbolism in the field of algebra turned out to be very beneficial. His concept of symbolism, however, lacked the use of notation of the general number 'n', which is used in general expressions. Also, he had a symbol to express only one unknown, and in case of more than one unknowns, he used to express it as 'first unknown' and 'second unknown.' This points out that he was more focused on particular results rather than the general ones.

Diophantine equations are the equations having two or more unknowns, that yields only positive integer solution. He considered two types of problems, linear and exponential equations. Diophantine linear equations are those in which a constant is equated to the sum of two or more monomials. Diophantine exponential equations are those in which unknowns can be expressed in exponents. The simplest example of a linear equation is ax + by=c, where a, b, and c are integers. An example of Diophantine exponential equation is the Fermat equation, a^n+b^m=c^k. It was observed that most problems in Arithmetica constitute quadratic equations. It was evident that he did not have any notion for zero, and he rejected negative coefficients by taking a, b, and c, all to be positive integers. He had provided only positive rational solutions to these equations and claimed that those equations are useless that give irrational, square root, and negative solutions. Also, there is no proof in his book that shows that he realized the fact that quadratic equations have two solutions.


DIOPHANTI
ALEXANDRINI
ARITHMETICORVM
LIBRI SEX.
LVTETIAE PARISIORVM,
M. DC. XXI.

"Diophantus was not, as he has often been called, the father of algebra. Nevertheless, his remarkable, if unsystematic, collection of indeterminate problems is a singular achievement that was not fully appreciated and further developed until much later."

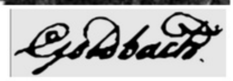
Article by Ankita Mondal
20MJMH017

The Text-to-Speech technology helps easy learning of the written material as it comes in audio form. Text-to-Speech technique comprises of getting the particular text as an input then converts the graphemes into the phonemes and finally converting those Phonemes into actual speech. Graphemes are the actual text whereas Phonemes are the smallest meaningful sound element of the language.

Text-to-Speech system comprises of five fundamental components which are- Text Analysis and Detection, Text Normalization and Linearization (Number conversion, Abbreviation conversion, etc.), Phonetic Analysis (converts the orthographical symbols into phonological ones using a phonetic alphabet), Prosodic Modeling and Intonation. The Text-to-Speech, uses higher mathematics and computing, is very often in day-to-day life.

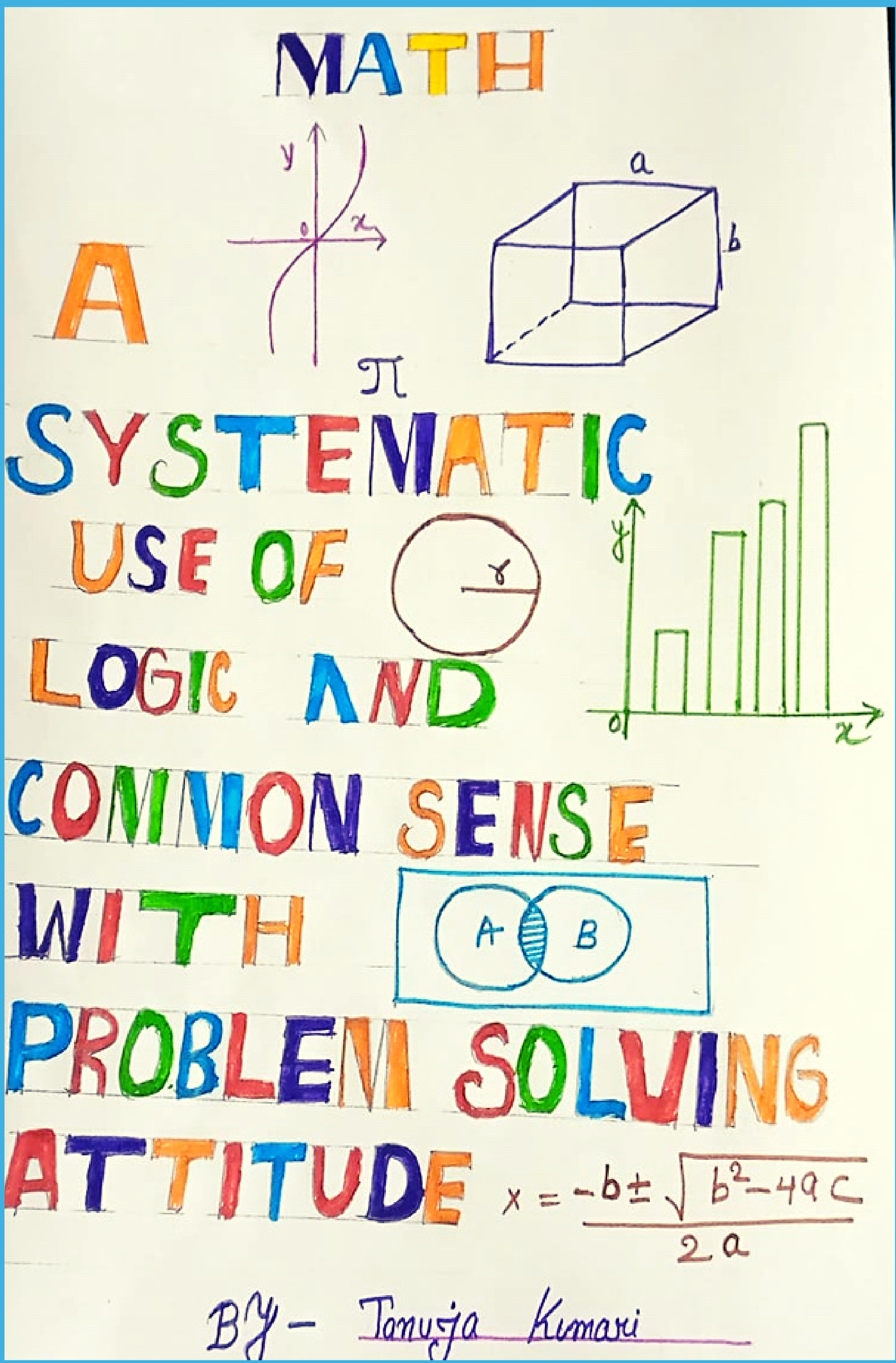
Article by Soumyajoy Das
20MJMH036

Goldbach conjecture, in number theory , assertion that every even integer greater than 4 can be written as sum of two odd prime numbers or in other words it says that every even integer is the sum of two numbers that are either primes or 1. The German mathematician Christian Goldbach first proposed this conjecture and it is named in his name.



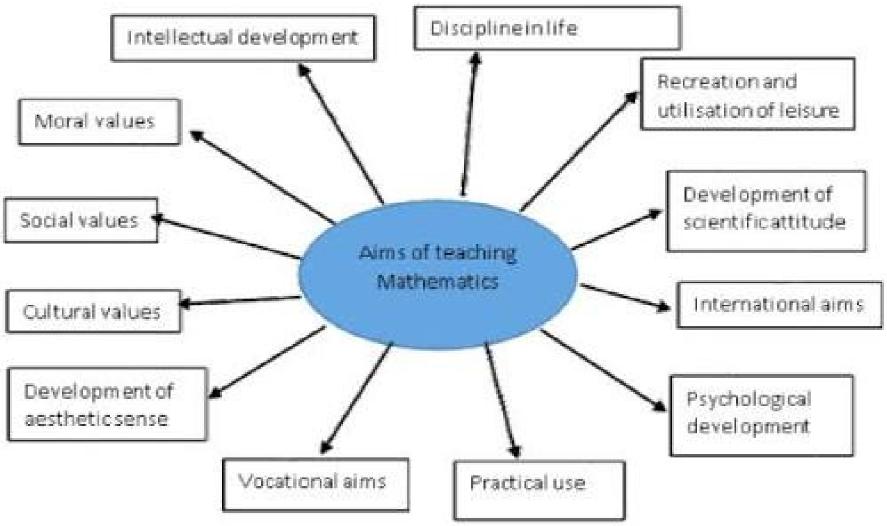
Christian Goldbach (18 March 1690 - 20 November 1764) was a German mathematician connected with some important research mainly in number theory; he also studied law and took an interest in and a role in the Russian court. After traveling around Europe in his early life, he landed in Russia in 1725 as a professor at the newly founded Saint Petersburg Academy of Sciences. Goldbach jointly led the Academy in 1737.However, he relinquished duties in the Academy in 1742 and worked in the Russian Ministry of Foreign Affairs until his death in 1764.He is remembered today for Goldbach's conjecture and the Goldbach-Euler Theorem. He had a close friendship with famous mathematician Leonard Euler, serving as inspiration for Euler's mathematical pursuits.

Article by Maitry Das
20MJMH001



Poster by Tanuja Kumari
20MJMH041

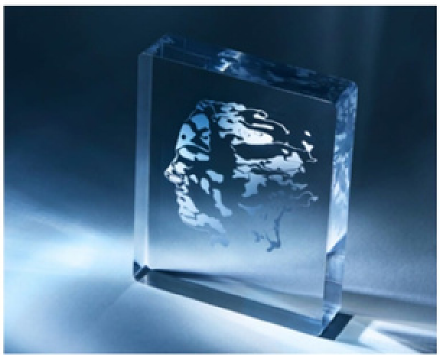
Some areas of information technology have significantly more math involved than others. For example, video game development with it's various physics simulations and intense graphics. Software development in general uses a fair amount of math. Network and systems administration use math for calculating IP addresses available in a given network, etc.



Since the fundamentals of information technology operate on logical systems where math is intrinsic to their operations, it may be difficult to find a single area of information technology that does not use math. Before we had digital computers, math mathematicians were kind of like software developers. They could develop a series of formulas and equations that took numbers as the input and delivered numbers as an output to represent some sort of function. This type of math is known as functional programming in software development. Just the other day, I wrote a plugin for a diagram editing application that calculated volume of a contour map. I wrote this plugin in Python and used the diagram editing applications API. Today I wrote a function that delivered an ETA for one of our printing systems. Tomorrow I plan on writing a unit conversion function. In summary, the application of math in information technology is nearly endless.

Article by Baishakhi Mallick
20MJMH033

The Abel Prize is awarded annually by the Norwegian Academy of Science and Letters. It is named after the Norwegian mathematician Niels Henrik Abel whose work was so groundbreaking that, according to the French mathematician Charles Hermite, it "left mathematicians enough to keep them busy for five hundred years." Abel was born in 1802 but died tragically young, at 26, from tuberculosis and in poverty.



The Abel Prize Committee look impact as a quality in a mathematician's work .There are various ways this impact can come about: through making connections between areas, starting new areas, or solving important problems.

The Abel Prize is designed tocover all areas of mathematics. The first prize in 2003 was awarded to Jean-Pierre Serre for "shaping the modern form of mathematics" working in pure mathematical areas such as algebraic geometry and number theory. In 2021 the prize was shared by Avi Wigderson and László Lovász for theoretical work that ended up helping to keep our online transactions safe. In 2014 it went to Yakov G. Sinai for his work on the theory of chaos. And in 2006 it went to Lennart Carleson in part for work on a theory that describes all things wave-like, and has many applications in modern technology. This small, and rather random, collection of examples indicates the breath of maths.

Article by Saradiya Kundu
20MJMH037

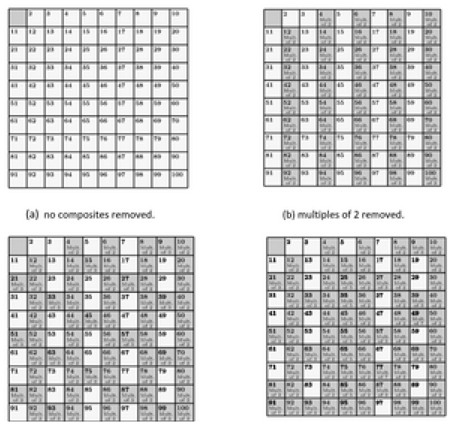
Mathematicians who work in the field of number theory are interested in how numbers are related to one another. One of the key ideas in this area is how an integer can be expressed as the product of other integers. If an integer can only be written in product form as the product of 1 and the number itself it is called a prime number. Other numbers, known as composite numbers, are the product of two or more factors, for example, 15 = 3 ⇥ 5 and 12 = 2 ⇥ 2 ⇥ 3. Ancient mathematicians devoted considerable attention to the subject.

Over 2,000 years ago Euclid investigated several relationships among prime numbers, among other things proving there are an infinite number of primes. For most of their history, prime numbers were only of theoretical interest, but today they are at the heart of a variety of important computer applications. The security of messages transmitted using public key cryptography, the most widely used method for transferring sensitive information on the Internet, relies heavily on properties of prime numbers that were discovered thousands of years ago. One of the fascinating things about prime numbers is the fact that there is no regular pattern to help predict which numbers will be prime. The number 839 is prime, and the next higher prime is 853, a distance of 14 numbers. But the next prime right after that is 857, only 4 numbers away.

A method for finding prime numbers that dates from the time of the ancient Greek mathematicians is known as the Sieve of Eratosthenes.

In figure we show the initial steps as well as the end result of the Sieve of Eratosthenes up to .100. Namely:

1. All integers from 2 to 100 in (a)
2. All multiples of 2 marked out in (b)
3. All multiples of 2 and 3 marked out in (c)
4. All composites marked out in (d)



Article by Shubhechha Saha
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Pure MATHEMATICS

The poetry of logical ideas

Pure mathematics is, in its way, the poetry of logical ideas

Mathematics and poetry, sounds like two different people who have nothing to do with each other. Where mathematics demands a lot of logical thinking and analytical approach ,on the other hand poetry sounds a less analytical and more emotional. But is it really that simple? Does Maths have nothing to do with creativity? Is it really true that poets do not think logically? The answer of all the questions is a big NO.

To understand this, we need to go through a story. A story of ""the most significant creative mathematical genius thus far produced since the higher education of women began."

Her name is Emmy Noether.
She was born in a jews family, distinguished for the love learning. In spite of all hurdles Noether played an enormous important role in the development of the present-day younger generation of mathematicians.
She played with symmetry. As a poem has symmetrical qualities that makes it lyrical to the earear, nature has internal symmetries : attributes that remain unchanged when a system goes through some other transformations.

In a tribute to Noether published in NewYork Times after her death, Albert Einstein wrote "Pure mathematics is, in its way the poetry of logical ideas," and he described Noether as the master of the craft.

Most people think of maths especially pure mathematics as it is not so useful in the real life. Which brings me to a Georg Cantor's quote where he says, "The mathematicians do not study pure maths because it is useful, they study it because they delight in it and they delight in it because it is beautiful."

Continued....

As the famous proverb says thay "Beauty lies in the eyes of the beholder." Now we are fortunate to have people like Emmy Noether, who recognize early in their lives that the most beautiful and satisfying experiences humankind have are not derived from outside but are bound up with developing of the individual's own feeling, thinking and acting. The genuine artists, investigators and thinkers always been persons of these kinds. No matter how much difficulties they faced throughout the course of their lives, the result of their endeavor are the most valuable contributions to the world. In this effort towards the beauty of nature, logical ideas and spiritual formulas are discovered for the deeper penetration into the laws of nature.

"My methods are really a method of working and thinking ; this is why they have crept in everywhere anonymously ." ~Emmy Noether

Article by Suvam Mondal
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