
EUREKA
EIGHTH EDITION

CONTENTS

HEAD OF DEPARTMENT'S NOTE

"Life is a mathematics equation. In order to gain the most, you have to know how to convert negatives into positives."

The department of Mathematics, is proud to present our annual subject publication EUREKA, which serves as a testament to the hard work, dedication, and innovative spirit of our faculty and students. This publication not only showcases the mathematical prowess within our department but also reflects our commitment to advancing mathematical education and research.

The objective of the publication of Mathematics " EUREKA" is to promote and appreciate the ideas and research done by young students in Mathematics. The publication encourages research, clear thinking, and determination among students by allowing them to foster thinking skills.

The annual subject publication is more than just a collection of articles; it reflects our collective passion for mathematics and education. As we look back on our achievements over the past year, we also look forward with anticipation to the future challenges and opportunities that lie ahead.

Mrs. Deepti Verma

PRESIDENT'S NOTE

"Maths is the invisible thread that weaves through every part of life, connecting us all with its logic, beauty, and infinite possibilities." It's a world of discovery, where every problem solved brings a sense of accomplishment, and every challenge overcome strengthens our ability to think creatively and critically.

Recently, I had the opportunity to experience collaborative learning in the sphere of Maths at the Euler's Circle Maths Camp. This event widened my microscopic view of collaborative learning into a kaleidoscope, where one learnt to solve a singular type of puzzle through fifty six ways, each uniquely intricated by its own solver. It's a reminder that math isn't just about finding the right answers; it's about the joy of learning, the connections we make, and the confidence we build along the way.

I am thrilled to present before you, Eureka for 2024-25, a product of collaborative plethora of efforts.

Jahnavi Mahana

FROM THE EDITORS' DESK

"Pure Mathematics is, in its way, the poetry of logical ideas."

Just like poetry, mathematics has a unique ability to capture the essence of complex ideas in beautiful and simple expressions. Mathematics has always been a source of inspiration and wonder in my life and I personally feel that the essence of mathematics lies in its beauty and its intellectual challenge. It has shaped the way I approach challenges, encouraging me to embrace learning and exploration in all aspects of life.

With this sentiment, I am exhilarated to present the latest edition of the Maths Magazine "Eureka". This issue features a blend of intriguing articles, challenges, and insights that celebrate the artistry of mathematical thought. I hope the articles and puzzles within this edition inspire you to see maths not just as tool, but as art form where logic and imagination meet.

Manshi Singh

Mathematics is the silent pulse of the universe, woven into nature's beauty—the arc of a rainbow, the rhythm of stars, the sway of a dancer. It's not just numbers, but the poetry of patterns, the language of logic and symmetry, revealing the intricate design of existence. In this edition of Eureka, we explore the diverse and indispensable role of mathematics, from ancient civilizations solving everyday problems to modern technology driving global decisions. With great pride, I present the eighth edition, a testament to the dedication of our students and the guidance of the entire math department.

Divija Patawari

CRYPTOGRAPHY: ENGULFED BY MATH

Modern cryptography relies heavily on mathematics, which provides the theoretical underpinning needed to protect digital communication. Fundamentally, cryptography uses sophisticated mathematical methods to encode and decode messages in order to convert data into a format that is impenetrable to unauthorised parties. It is ‘impossible’ to “overestimate” the importance of math in cryptography in a world where secure networks are necessary for personal communications, financial transactions, and even national security. I would therefore declare applied mathematics to be the “game changer” here.

The features of prime numbers and modular arithmetic, in particular, are important topics in number theory. This theory forms the foundation of cryptography systems. Rivest-Shamir-Adleman (RSA) is one of the more popular modern encryption algorithms that depends on the difficulty of factoring big integers into their prime factors.

The RSA operates by multiplying two big prime numbers to create a public key that is used for encryption. The difficulty of reversing this process—that is, determining the initial prime factors without knowing them—ensures the security of the system because existing computer techniques cannot effectively solve such issues for huge numbers of variables.

Elliptic curves are fundamental to contemporary cryptography because they serve as the basis for effective and safe encryption techniques. The fundamental idea underlying elliptic curve cryptography (ECC) is found in the elliptic curves' mathematical characteristics, which are given by the following equation:
y^2=x^3+ax+b

To sum up, cryptographic techniques that safeguard contemporary digital communications are based on mathematics. In a world where information security is critical, mathematical constructs like prime factorisation and elliptic curves guarantee privacy and integrity.

JAHNAVI MAHANA
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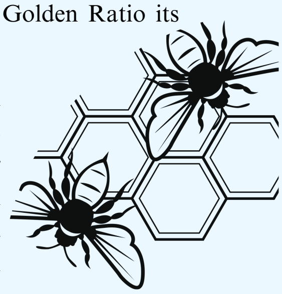
SC-SCIENCE

THE GOLDEN RATIO

MATHS IN ART AND ARCHITECTURE

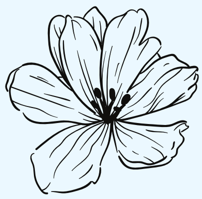
The Golden Ratio, or divine proportion, is a ratio of two numbers that comes out to be roughly 1.618. The Greek letter phi(φ), which is commonly used for denoting it, is closely linked to the Fibonacci sequence in which each number is equal to the sum of the two numbers preceding it. The Greek mathematician Euclid, considered to be the father of Geometry, gave the Golden Ratio its initially written formulation in his book "Elements."



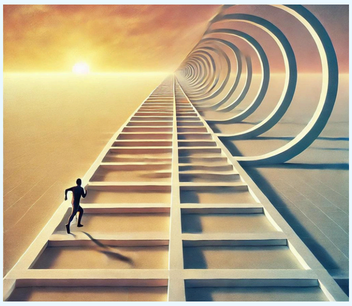
Given its unique properties and frequent occurrence in nature, art, and building, this irrational number has captivated mathematicians, artists, and architects for millennia. It is difficult to pinpoint the exact moment when the golden ratio was discovered. The proportion determined by the golden ratio is used in the construction of several pyramids, most notably Cheops' pyramid. Similarly the Parthenon in Athens, Greece, is believed to be designed based on the Golden Ratio such as this ratio is believed to be present in elements like the height of the structure and the distance between columns.

Some other famous examples we can take are Leonardo da Vinci's "Mona Lisa". It's been suggested that the human body's proportions in his well-known drawing "Vitruvian Man" show the Golden Ratio. The Golden Ratio was also used by Spanish surrealist artist Salvador Dalí in his masterwork "The Sacrament of the Last Supper". The canvas's dimensions are referred to as a Golden Rectangle, with a φ ratio between the longer and shorter sides.

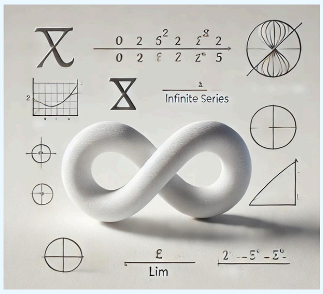
DIVYANSHI SHAH
P/2578
X C



ZENO'S PARADOX INFINITUDE



The Achilles and the Tortoise Paradox is a concept formulated by the ancient Greek philosopher Zeno. It addresses the well-known ideas of motion and infinity. In this thought experiment, Achilles, a swift warrior, competes in a race against a tortoise that has been granted a head start. Zeno posits that Achilles will never overtake the tortoise, as each time Achilles reaches the point where the tortoise started, the tortoise has already advanced a short distance further.



To break this down mathematically, consider that if the tortoise is 100 meters ahead and Achilles runs 10 times faster, then once Achilles covers 100 meters, the tortoise has moved 10 meters ahead. When Achilles then runs this extra 10 meters, the tortoise has moved another meter, and this in turn continues indefinitely. Such is the line of argumentation of Zeno: no matter how fast Achilles might run, he will always have a distance to cover that places him behind the tortoise.

Yet this paradox calls into question some of the fundamental items in the learning of limits and convergence in mathematics. The lengths Achilles must run represent a geometric series—100 meters, 10 meters, 1 meter, etc.—that converges to a finite sum. Thus, it can be calculated that he will overtake the tortoise after running a distance of 111.11 meters in total.

The Achilles and the Tortoise paradox points to the intricacy of infinity and continuity, motivating improvements in calculus and putting limits on a rigorous footing—a fact with deep implications for mathematics and physics.

DRISHTI TODI
C/3051
PRE SC COMMERCE

MATHEMATICS USED BY DETECTIVES

“In the realm of detective work, maths transforms chaos into clarity and mysteries into solutions.” It turns out that detectives use Maths to crack some of the toughest cases out there. From figuring out where a crime might happen next to decoding secret messages, math helps detectives solve mysteries that are way beyond our imagination. Ready to see how numbers and logic play a starring role in crime-fighting?

To uncover the criminal patterns, detectives use statistical methods to analyze the crime data. In 2002, during investigating the sniper attacks in the D.C. area by John Muhammad and Lee Boyd Malvo, detectives noticed the attacks followed a pattern around the D.C. Beltway. This clue helped them set up roadblocks, and a truck driver recognized the suspects' car from alerts, leading to their arrest. Spotting these patterns was key to solving the case.

All of you must have learned about probability but did you know that evidence is decoded using probability? When detectives find DNA or fingerprints which are forensic evidence at the crime scenes, they use Maths to calculate if it matches a suspect. And then they use probabilities to show if the match is strong or if it could just be a coincidence. In the 2018 arrest of the Golden State Killer, Joseph James DeAngelo, forensic experts used DNA analysis to match evidence from crime scenes to DeAngelo.

By calculating angles and trajectories, investigators can determine the shooter’s position and understand the sequence of events. In 2017 Las Vegas shooting, investigators used ballistics and trajectory analysis to solve the case. By studying where bullets hit and their angles, they figured out that the shooter, Stephen Paddock, fired from multiple windows in his hotel room.

To summarise, Mathematics is not just for classrooms—it's a secret weapon for detectives. In the world of crime-solving, maths helps turn puzzles into solutions.

ANANYA AGRAWAL
K/2914
1X B

MATHEMATICS AND MARVEL HEROES

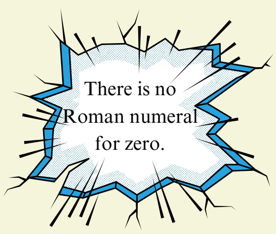
Who doesn't enjoy watching television, especially shows about superheroes? 'Marvel', in particular, is a favorite. But did you ever think superheroes like Iron Man use maths? In fact, maths is just as vital as their superpowers.

Take Iron Man's suit, for example. Its strength and durability involve structural engineering principles like stress-strain calculations, ensuring it withstands harsh conditions. The stress-strain relationship describes how materials deform under force, critical for designing the suit.

Flying also relies on maths. Propulsion and flight dynamics require calculations of lift, drag, and thrust, based on aerodynamic principles, to achieve stable flight. During combat, Iron Man's suit performs real-time calculations to analyze enemy movements and optimize strategies, showcasing how maths shapes targeting systems.

Finally, thermodynamics plays a role in managing heat generated by the suit, with calculations ensuring cooling systems prevent overheating. Iron Man's technology is proof that maths is at the core of superhero abilities!

DIA CHOUDHARY
K/2971
IX D

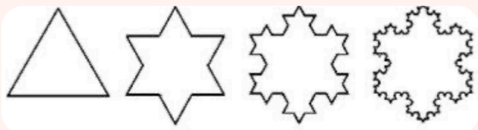


FRACTAL GEOMETRY: NATURE'S HIDDEN BLUEPRINT

"A fractal is a way of seeing infinity".
This profound quote was stated by Mandelbrot, that encapsulates the essence of mathematics in nature. Geometry is a branch of mathematics that deals with properties of shape of individuals object, but Euclid failed to describe the pattern of nature through geometry because of its complexity.The beautiful pattern in nature was observed by Benoit B. Mandelbrot who then introduced the concept of fractals and fractal dimensions.The term fractal is derived from Latin word "fractus" which means broken or fractured. It is the study of the roughness of any complex shape that we are surrounded by. It helps us achieving harmony with the nature, that is between clear shapes and chaotic imperfection. One of the example of self similar fractal is 'Koch Curve' which is a geometric substitution that creates a jagged fractal, similar to a coastline. It is used to construct a Koch snowflake by a factorised side of triangle.

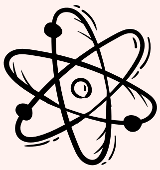
Fractal geometry has a wide range of application both within mathematics and also in other categories like geography and architecture. It is a powerful tool in modern architecture which encourage architects to build visually captivating buildings with structurally efficient composition. Fractal geometry also helps us in generating realistic landscapes and its application also includes climate modelling, weather predication and creation of artificial habitat. Even the universe shows a definite aspect of fractal geometry with a fractal dimension of about 2. A set of minor cosmological theories state the distribution of matter in the universe is fractal. Through these researches similarities between the brain and universe has been remarkably found. So does that mean the cosmos has a consciousness of its own ?Or the universe is itself someone's brain and we all are a part of it? Fractal shapes also exists throughout our body in lungs, blood vessels and neurons. It also has medical application like to aid diagnosis of abnormal heart rhythms, tumors and cancer. In conclusion Fractal geometry gives us an understanding of the geometry of nature.

MANSHI SINGH
P/3239
SC SCIENCE



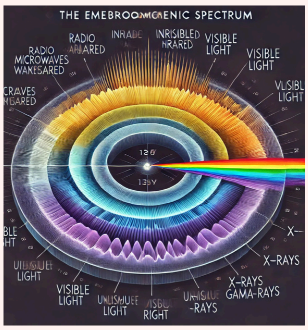
UNDERSTANDING THE INVISIBLE WORLD

The electromagnetic spectrum encompasses a broad range of electromagnetic waves, many of which are invisible to the human eye. These waves, from low-frequency radio waves to high-frequency gamma rays, carry energy and power essential technologies. Each region of the spectrum—radio, microwave, infrared, visible, ultraviolet, X-ray, and gamma rays—has distinct properties and serves various practical applications in fields like communication, healthcare, and astronomy.



Mathematics is crucial for understanding and analyzing the spectrum. The wave equation v=fλ helps identify different types of waves, while Fourier transforms break complex waveforms into their individual frequency components. An analogy for this process is a detective at a party who identifies all the waves by separating them based on speed and size. Planck’s equation E=hf links energy to frequency, showing how energy is directly related to the wave’s vibration speed. These mathematical tools help quantify and explore wave properties, aiding in fields such as physics and engineering.

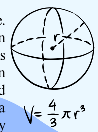
The applications of these mathematical techniques are extensive. In astronomy, they help measure the redshift and blueshift of starlight, offering insights into stellar movement. Telecommunications rely on signal processing and frequency modulation, driven by spectrum maths. As technology evolves, innovations like machine learning and advanced computational models are improving the precision of spectral measurements, advancing fields such as telecommunications, medical imaging, and astrophysics.



FREYA AMAR SHAH
P/2977
IX E

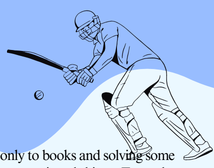
UNVEILING THE NUMBERS BEHIND THE GAME

I am sure we all use the words Mathematics and Sports in our everyday life. Maths is the science that deals with the logic of arrangement and quantity . On the other hand, Sports is a human activity involving physical exertion and skills as the primary focus of the activity. Have you ever thought that these two can be interrelated? Some people are not good at maths but are good at sports and vice versa. For those people, they might think that maths is not their cup of tea but if you look from a mathematician's perspective you see that when you play a sport you are performing math knowingly or unknowingly.

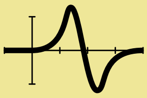


There are various aspects behind maths like supposed statistics or probability. When a person is playing basketball, the chances of the basketball going into the net can be referred to as statistics of shooting in basketball. Hypothetically if two teams A and B are playing cricket and if team B has more runs and fewer wickets, then they are most likely to win the match. So now we can rephrase it that team B has more probability of winning the cricket match than team A.

As there is maths involved in playing sports, maths is also engaged in giving remunerations to the players. For the players, their remuneration is salary and contracts. Mathematical models determine player valuations, salary caps, and contract negotiations. Some real-life examples are Oaklands Athletics' use of advanced baseball statistics that revolutionized how teams evaluate players. Another example we have is teams like Liverpool FC which uses data analytics to scout players and come up with game strategies, leading to significant success.



I believe that maths is not confined only to books and solving some equations but also includes the above mentioned things. From the physics of a perfect golf swing to the economics of player contracts, math is everywhere in sports. By understanding and leveraging mathematical principles, athletes, coaches, and analysts can enhance performance, develop strategies, and engage fans in new and exciting ways. As Albert Einstein "Mathematics is, in its own way, the poetry of logical ideas".



KUHU PORWAL
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PRESC COMMERCE

MYSTIC PUZZLES

1. I have keys but open no locks. I have space but no room. I have a face but no eyes. What am I?

2. What is the only number that is spelled with the same number of letters as its value?

3. What number do you get when you multiply all the numbers on a phone's number pad?

4. I am a two-digit number. My tens digit is three times my ones digit, and the sum of my digits is 12. What number am I?

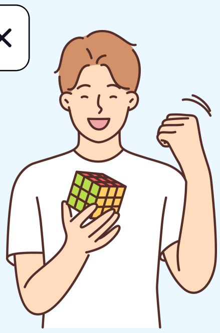
5. If 10 people at a party shake hands exactly once, how many handshakes occur?

6. What's the next number in the sequence: 1, 4, 9, 16, 25?

7. Minimum number of socks to guarantee a matching pair from 10 black and 10 white?

Answers

1. A keyboard
2. Four
3. 0
4. 39
5. 45 handshakes
6. 36
7. 3 socks



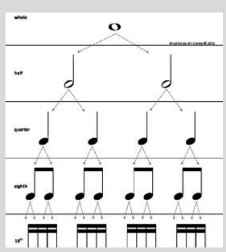
MATHEMATICS IN MUSIC

Music- the epitome of peace and comfort. Whereas Maths is a challenging yet rewarding tool. Now, music and maths might seem like polar opposites, but they're actually deeply connected.

> As a high schooler, I've discovered that maths is present everywhere in music, making it even more fascinating. May it be the beats we tap our feet to or the tune we simply can't get over, it's all about mathematics as rhythms are essentially patterns and fractions.

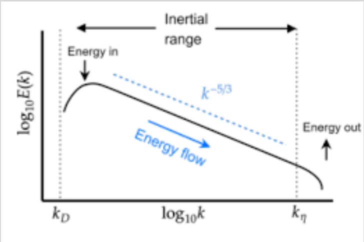
> For instance, a 4/4 time signature means there are four beats in a measure, each a quarter note long. Even the pitches and harmonies that make our favorite songs catchy are rooted in mathematical ratios. The frequencies of notes follow specific patterns, creating harmony when played together. Understanding these relationships can help us compose and appreciate music on a deeper level. Plus, maths helps in the technology behind music production, like audio editing and sound engineering. Therefore, the next time you're listening to music, try catching on to the beats hidden behind the lyrics.

AARNA AGRAWAL
M/2297
PRE SC COMMERCE

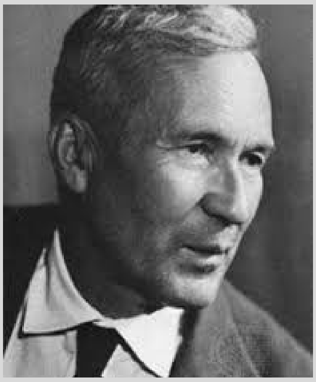


'THE STARRY NIGHT' -AFTER REVELATION

One of the most well-known paintings in art history is Vincent van Gogh's 'The Starry Night' (1889), known for its swirling blue hues and bright gold streaks in the sky. Recent research indicates that the confident brushstrokes are consistent with a scientific theory that was not identified until years later. While the artwork is often seen as reflective of his mental health struggles, a study in the journal "Physics of Fluids" proposes that it also corresponds with Kolmogorov's theory of turbulence, outlining fluid dynamics patterns.



Andrey Kolmogorov, a mathematician from Russia, discovered how energy flows in water or air: Large swirls, or "eddies," divide into smaller eddies in a predictable manner. CNN's Katie Hunt describes turbulent flow as a type of movement observed in moving water, ocean currents, blood flow, billowing storm clouds, and smoke plumes. Picture yourself on a bridge, observing the flow of the river. Swirls can be observed on the surface, and they are not random but organized into specific patterns that can be anticipated through physical laws. Huang and his team analyzed the patterns and strokes in 'The Starry Night' painting and utilized van Gogh's color selections to predict the motion of the sky. It was discovered that 14 of the whirling patterns in the artwork correspond to Kolmogorov's theory. Measurements of the tiny brush strokes also correlated with Bachelor's scaling, a concept that explains energy movement in small-scale turbulence.



I believe this is not just a random occurrence. Frank believes that Van Gogh was reacting emotionally and intuitively to the sky, capturing patterns that could also be found through a detailed mathematical analysis .He was representing in the language of painting what would later be represented in the language of mathematics.

DIVIJA PATWARI
SC-COMMERCE
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GEOMETRY BEHIND BUTTERFLY WINGS

We've all heard the saying that maths is everywhere, from plants and houses to the intricate designs of butterflies' wings. These wings display a beautiful combination of geometry and symmetry, but beyond aesthetics, the structure is vital for the butterfly's stability and flight. The design isn't just for beauty but plays a key role in supporting flight efficiency.

One key aspect is bilateral symmetry, where each wing mirrors the other exactly. This symmetry ensures balance and stability during flight, making it easier for the butterfly to perform quick, agile movements in the air. Without this precise symmetry, a butterfly wouldn't be able to fly as smoothly.

In addition to symmetry, the vein patterns on butterfly wings also contribute to flight. These veins, positioned geometrically, help distribute stress evenly, preventing the wings from collapsing under pressure. The combination of rigid and flexible areas of the wing helps the butterfly adapt to changing conditions during flight, much like how an airplane wing operates.

The final piece of the puzzle is resonance and wing dynamics. Each wing has a specific frequency at which it flaps most efficiently, known as its resonant frequency. When the butterfly flaps its wings at this frequency, it uses less energy to remain airborne. The structural aspects of the wings, like symmetry and vein patterns, all contribute to this efficiency, showcasing how math and nature work hand in hand to enable a butterfly's graceful flight.

ADA SINGH
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9E

BUTTERFLY SHAPED PRINTED MONOPOLE ANTENNA FORULTRA WIDE BAND APPLICATIONS

Abstract: In this paper, a microstrip line fed butterfly shaped monopole UWB antenna is proposed for wireless applications. The wings of butterfly shaped monopole antenna is formed by adding two rotated ellipse of same radius symmetrically placed about the centre of feeding line. The proposed antenna exhibits impedance bandwidth of 3.1-11.9 GHz which covers the whole ultra-wideband frequency range from 3.1-10.6 GHz. The performance is characterised in terms of VSWR, radiation patterns, impedance bandwidth and gain. The proposed antenna can be used for various UWB applications like high performance in noisy environment, low transmission power, cost effectiveness and large channel capacity.

I. INTRODUCTION

The ultra-wideband (UWB) antennas are gaining huge attention to the researchers due to several advantages like large bandwidth, low power consumption and high data transmission rate, simultaneously there are various wireless systems that use antennas for transmitting and receiving information such as satellite communication, mobile communication, health care monitoring and many more. For this the size and shape of antennas have been a prominent issue. Microstrip antennas are low profit antennas of small size and weight and easily manufactured with economic considerations. UWB include high data rate, high bandwidth, low power consumption high security. UWB also consist radio communication technology that transmit pulse of very low energy for short duration it also includes less interference and power levels which are comparable to noise levels that is upto -41.3 dBm/MHz they also make the system secure enough because detection of noise signals is difficult, so transmission of extremely short duration pulses makes UWB operation quick and fast enough and enable it for many real time applications.

In this paper, the microstrip line fed butterfly shaped printed monopole antenna is designed on flame retardant type-4 (FR-4) dielectric substrate for the performance analysis in terms of antenna parameters for ultra-wideband applications. Stepwise designing of butterfly shaped monopole antenna shown in section II. Simulated and fabricated results have been discussed in section V, section VI, section VII.

II. DESIGN OF PROPOSED ANTENNA

The Geometry of Proposed Butterfly shaped antenna is shown in the Fig 1. The desired antenna has been fabricated on FR-4 dielectric substrate, which is one sided copper laminated. The design of proposed antenna occurs various stages which are discussed in this section.

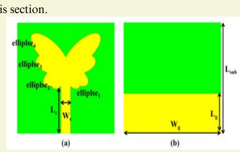


Fig 1: Geometry of the proposed four arms butterfly shaped UWB antenna

Antenna Design:- The wings of butterfly shaped antenna are formed by adding two rotated ellipses of same radius (radi) symmetrically as shown in Fig 2. In the consecutive of Fig 2(a), a single wing monopole antenna is designed by using rotated ellipses 1. The structure is supplied by a microstrip line, for this feeding purpose the width and length are Wc and Lc taken which provide the suitable matching in terms of impedance. The overall size of the antenna is Lsub × Wg and ground plane size is Lg × Wg. It is resonating at 6.5 GHz and 10.9 GHz and formed a wide impedance bandwidth ranging 5.7-12.4 GHz.

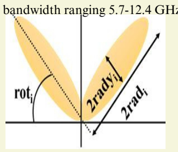
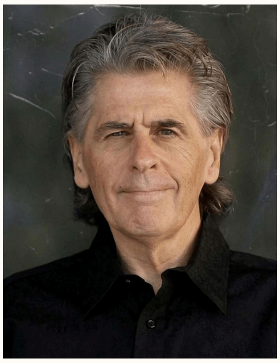


Fig 2: The implementation of butterfly structure

PIONEERS OF NUMBERS: CELEBRATING ICONIC MATHEMATICIANS

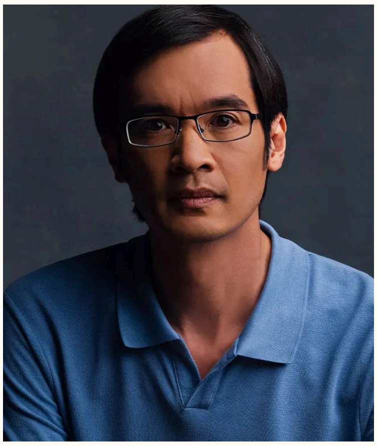


KEITH DEVLIN

- Areas of Specialization: Theory of Information, Models of Reasoning, Mathematical Cognition.
- Consulting Professor of Mathematics at Stanford University.
- Co-Founder and Executive Director of Stanford''s Human-Sciences and Technologies Advanced Research Institute, founded in 2006.
- Received Bachelor's in Mathematics at King's College, London and his Ph.D. in mathematics from the University of Bristol in 1971.
- He authored over 30 books during his storied career as a mathematician and 80 research articles.
- In 2007 he was awarded the Carl Sagan Prize for Science Popularization.
- He is the co-founder and president of BrainQuake, a company that makes video games to facilitate learning mathematics.

- Areas of Specialization: Bhargava Cube, Bhargava Factorial, 15 and 290 theorems.
- He is the R. Brandon Fradd Professor of Mathematics at Princeton University.
- Holds a professorship at Leiden University in the Netherlands and multiple faculty positions at universities in his home country of India.
- His specialty in mathematics is number theory, the core and historically "famous" study of the integers.
- He received his bachelor's degree in Mathematics from Harvard University in 1996, and his Ph.D. from Princeton in 2001.
- Bhargava has discovered 14 new Gauss-style composition laws in number theory.
- Bhargava won the Fields Medal in 2014.

MANJUL BHARGAVA



- The Prodigy Who Became the Greatest Mathematician of His Generation.
- Tao's contributions have reshaped various fields of mathematics.
- Many mathematicians focus on a single area, but Tao has contributed to several fields.
- His work includes: The Green-Tao Theorem The Erdős Discrepancy Problem Compressed Sensing Tao's Inequality Partial Differential Equations (PDEs) Oscillatory Integrals Tao's contributions to the Green-Tao Theorem, Tao's Inequality, and partial differential equations are not just academic achievements—they are breakthroughs that continue to shape how we understand the world.

TERENCE TAO

- Areas of Specialization: Algebraic, Geometric, and Topological Combinatorics, Chip-Firing.
- She currently holds the title of Associate Professor of Applied Mathematics in the Division of Applied Mathematics at Brown University.
- She is also the Associate Director of the Institute for Computational and Experimental Research in Mathematics (ICERM).
- Klivans previously held positions at The **University of Chicago** and Cornell University.
- She is mostly focused on algebraic, geometric, and topological combinatorics, particularly in regards to chip-firing games and sandpile models.
- She is seen as a leading authority on the subject, having authored The Mathematics of Chip-Firing.
- For her work, she has received awards and honors including a National Science Foundation Conference Grant.

CAROLINE KLIVANS

$ax^2+bx+c=0$

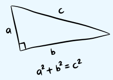
$\frac{x}{a}+\frac{y}{b}=1$

$a^2+b^2=c^2$

ACTIV

$a^2+b^2=c^2$

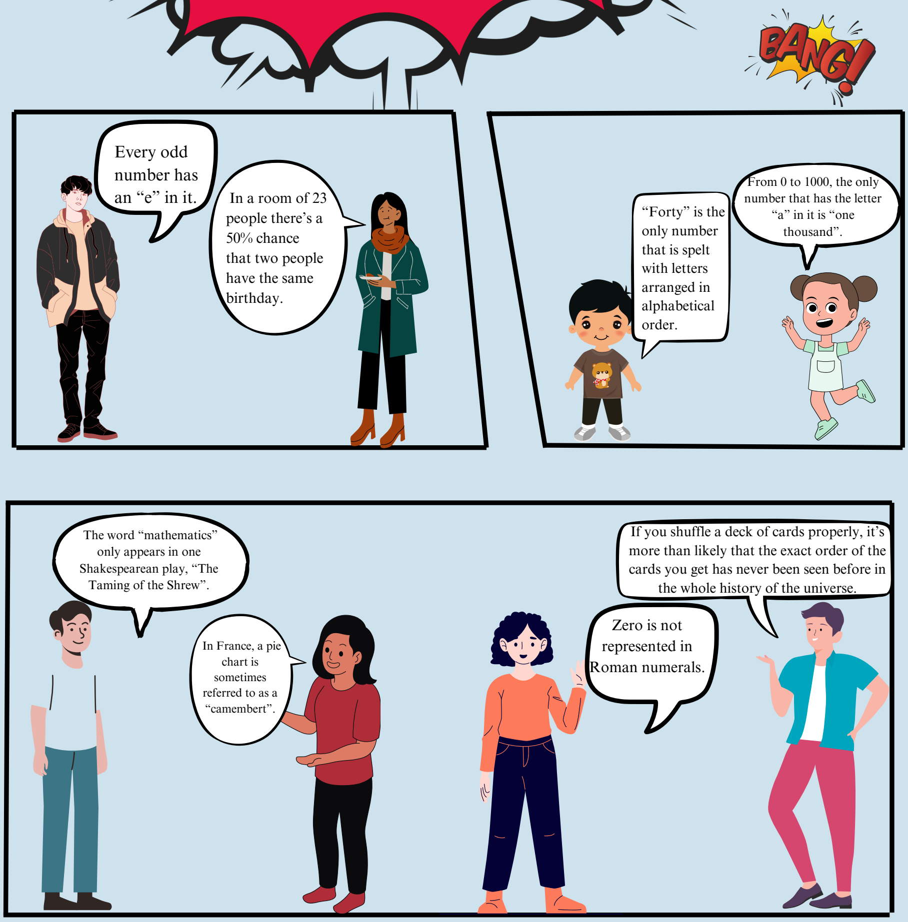
ITIES



$ax^2+bx+c=0$

$\frac{x}{a}+\frac{y}{b}=1$

FACT OR FICTION? YOU DECIDE!



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