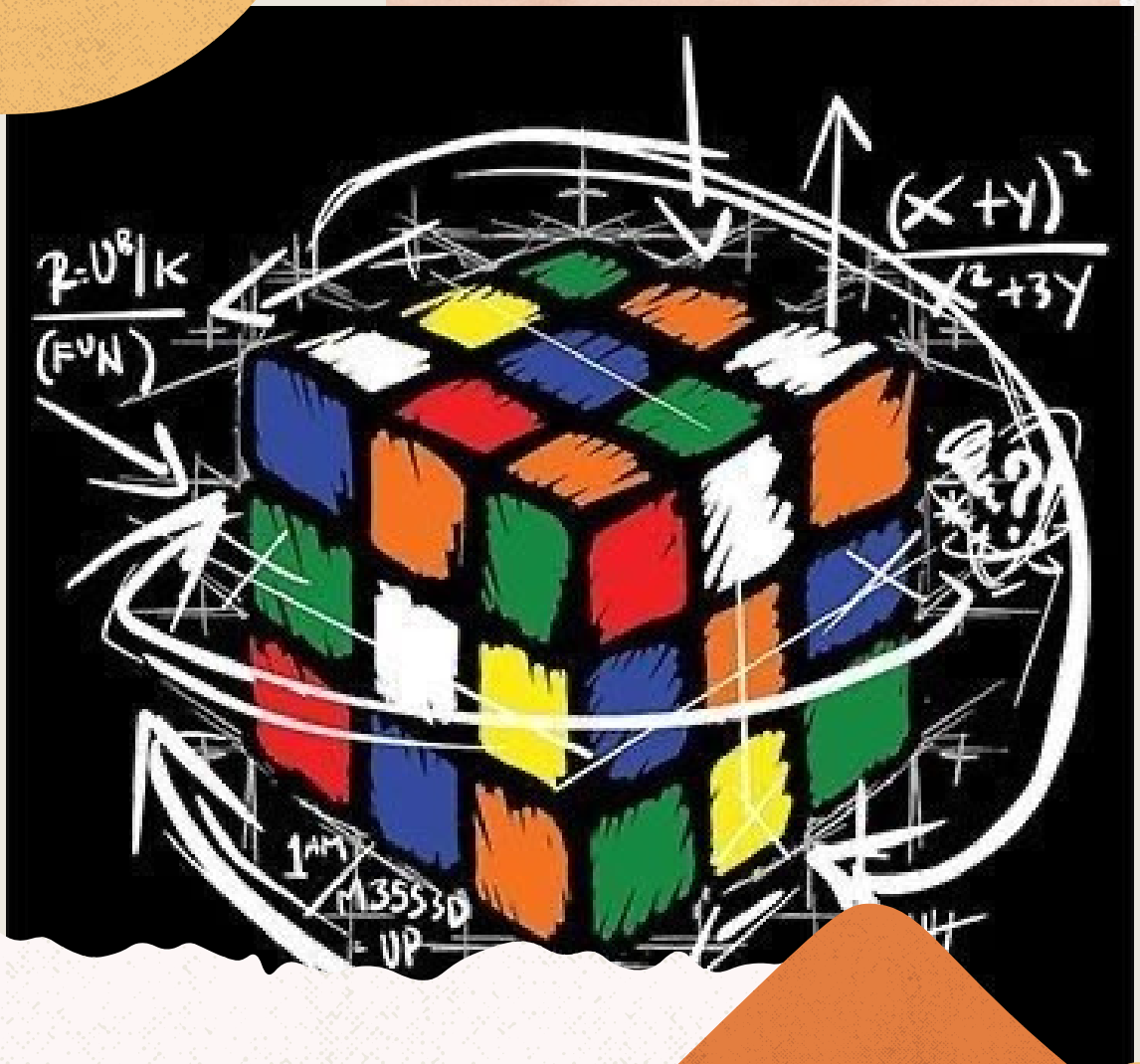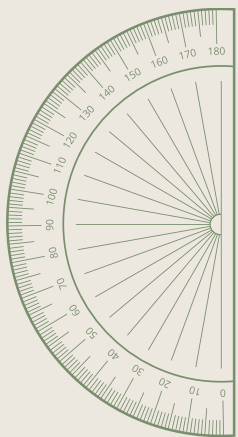# G.D.GOENKA PUBLIC SCHOOL, DWARKA

Indulge in fascinating articles, heart touching poem and the shared love for math

Máthēma

META

Issue 2 | December 2023

Mathophobia

learn how to beat the fear of mathematics and know that you are not alone.

Editorial Team

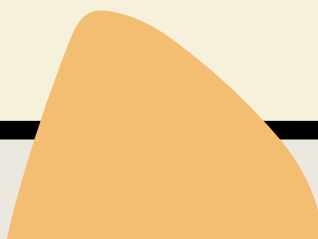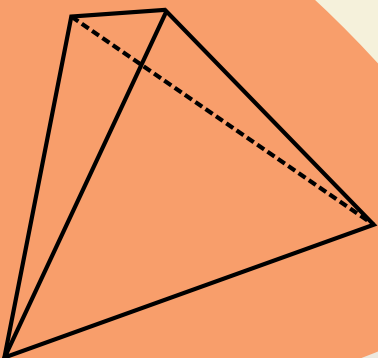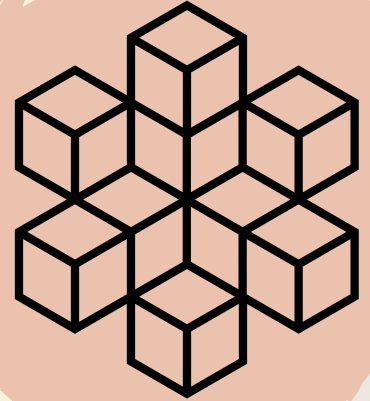|	
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Mathematics gives us hope that every problem has a solution

EDITOR'S PEN

Mathematics is, in its own way the poetry of logical ideas

Dear Readers,

Welcome to the latest edition of our beloved Mathematics Magazine Máthēma Meta. As we delve into the fascinating world of numbers, shapes, and patterns, we are reminded of the enduring beauty and power of mathematics. In this editorial, we celebrate the countless ways mathematics enriches our lives and propels us towards a brighter future.

Mathematics is often described as the universal language, a tool that transcends cultural and linguistic boundaries. It's the thread that weaves the fabric of the universe together, from the tiniest subatomic particles to the vast expanse of the cosmos. The intricate dance of equations and formulas unveils a world of awe-inspiring complexity and elegance.

Mathematics is not only the key to comprehending the cosmos, but it also plays an essential role in our daily lives. It's the foundation of technology, engineering, finance, and countless other fields. From the algorithms that power our search engines to the encryption that protects our online data, mathematics is the unseen force that drives our modern world. In this edition, we shed light on the practical applications of mathematics, demonstrating how it underpins the technological wonders that surround us.

Beyond its utility, mathematics is a source of endless wonder and creativity. It's the art of problem-solving, the joy of discovering patterns, and the thrill of conquering intellectual challenges. Mathematicians are explorers in a world of ideas, venturing into uncharted territories to uncover new truths and expand the boundaries of human knowledge. In this issue, we pay tribute to the creativity and ingenuity of mathematicians and explore their contributions to art, music, and the realms of the abstract.
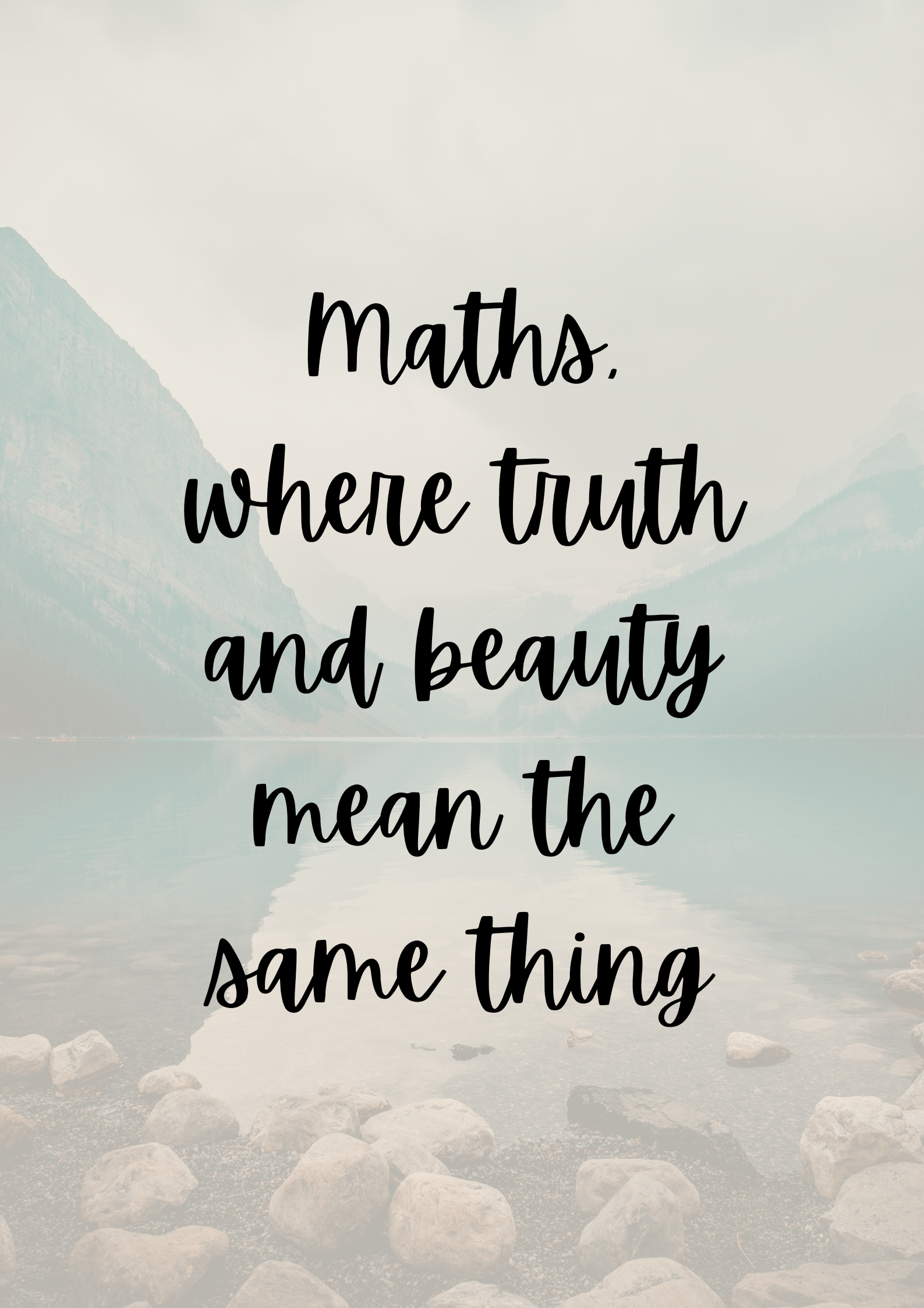
As we journey through this issue, we invite you to rekindle your appreciation for mathematics, whether you are a lifelong mathematician, a student just beginning your mathematical voyage, or simply a curious reader eager to explore the beauty of numbers. Mathematics is not just a subject to be studied; it is a world to be experienced, where curiosity, creativity, and critical thinking converge.

We hope this edition sparks your curiosity, inspires your creativity, and rekindles your appreciation for the ever-enchanting realm of mathematics.

Thank you for joining us on this mathematical journey. We look forward to sharing more captivating stories, insights, and discoveries with you in the future. Enjoy the read!

Sincerely,

MUKTA RANJAN SAHAY, HOD, MATHEMATICS.

Maths,
where truth
and beauty
mean the
same thing

ZERO

By Shree Aggarwal, 9A

" A zero itself is nothing, but without a zero you cannot count anything; therefore, a zero is something, yet zero..."
By- Dalai Lama

The credit for the invention of zero definitely goes to the Indian mathematician Aryabhata. Zero, an important number that signifies nothing, has become an essential part of our lives. It was first invented in the 5th century and holds significant importance in all walks of life. Zero is the point between negative and positive numbers. It can also be referred to as the origin. Zero helps us understand and explain concepts that do not have physical forms. The number zero is used as a placeholder in the place value system. For example, two zeros before a number indicate the hundred position, while a single zero before a digit indicates the tens position. We encounter zero in all aspects of life, including mathematics, economics, physics, calculus, finance, temperature, and many more.

Even the devices you use run on binary strings of zeros and ones. Without these zeros, the world would not be the same. Most programs would not exist. Humanity's discovery of zero was "a total game changer... equivalent to us learning language," says Andreas Nieder, a cognitive scientist at the University of Tübingen in Germany.

Zero's influence on our mathematics today is twofold.
Firstly, it's an important placeholder digit in our number system. Secondly, it's a useful number in its own right. Just for a moment, consider what Mathematics would be like without zeros. Mathematical and algebraic calculations would have been difficult because there would be no tens, thousands, or lakhs.
If there were no zero, our lives would not have been as developed. Mathematics would be limited to the natural numbers, and complex scientific equations would not exist. The world would not be as developed.

MATHS IN DAILY LIFE

By Anshuman

Mathematics is very useful in our day-to-day life. Use of mathematics helps us in performing numerous tasks with great precision and ease. One of the common uses of mathematics is money management. With the help of mathematics skills, we can easily calculate simple and compound interest. Mathematics help people to calculate which bank is giving better interest on their investment for a specific period. It will assist in deciding which credit card and loans charge a low rate of interest.

To buy furniture or a home décor accessory like curtains, doors, windows, etc., it requires taking an exact measurement of the place where it will be kept. House furnishing firms must know that the dimension of rugs and furnishings matches to the area of the room. Math skills help in calculating the dimensions of a space. These skills are also helpful at the time of remodelling your furniture and apartments.

In cricket, math will help them in calculating how many runs a player has scored, how many balls are left in an over, how many runs the team must make to win, etc. When you possess math skills, your game-watching experience becomes more enjoyable and exciting.

Calculation of monthly household budget is an essential task performed by almost every householder. Keeping a list of earnings and expenses will assist you to track your budget. It will help you know whether you are saving or incurring a loss.

Another significant area to use math skills is in shopping. Shopping stores come with another important option to attract buyers, i.e., EMI. With math skills, you can easily determine EMI for any product. It will help you decide which store is offering the best financing for your food items. Knowledge of math help you take better decisions in life, that in turn helps in making life easier.

MATH MANIA

BY ATHARV MAKHIJANI, 7D

One fine morning, I woke up and went to school. It was a completely normal day or I thought it was. It was the first period. I greeted the teacher and while learning about the importance of math I dozed off. When I woke up I was at my house, I was shocked to my very core as I realized there was something missing.

After this incident I saw how asymmetrical the walls, the floor and the building were. Minutes passed and it was time to play with my friends, we were perplexed. My friends and I didn't know what to play, so we just talked till we wanted to, still I thought something was missing. Whatever I knew like logic, geometry, numbers all of it never came to my mind. I was frightened. When I was coming back home, I kept falling down the stairs as they were completely unorthodox. I went down again to get some bread, running through the uneven stairs with no ease at all. After reaching the dairy, there I took the lopsided bread as there were no dates to decide whether the bread was fresh and I went away as there was no form of payment. After a while I could hear a noise. I could hear someone screaming in the background tried to figure out what it was and I woke up in the class. Realizing the true meaning of the dream, which was math is important and if it didn't exist houses would collapse, most sports would not exist, chess and checkers would be a game of luck not skill. Math has several branches like algebra, geometry, trigonometry, etc and each of them plays an important role. Geometry plays an important role in architecture ; while trigonometry is used in sports like football I would like to say that 'MATH MATTERS IN LIFE'. No matter how much you try running from it, it will find a way of coming back to you as it is omnipresent. This dream gave me a hint of how the world would be without mathematics. It showed me how something we know existed and is the 'universal truth' is all just sheer logic. I would like to end by reciting a beautiful quote by Shakuntala Devi " Without mathematics there is nothing you can do. Everything around you is mathematics. Everything around you is numbers".

The Unseen Significance of PI

By KASHIKA TIWARI , 9B

A long time ago, in a bustling Math school, there was a small, seemingly insignificant symbol called Pi. Little did Pi know that it held a remarkable and profound significance in the world of mathematics. In the Math school, Pi lived quietly amidst the other symbols, oblivious to their unique properties. It was just one of many symbols used by the students and teachers to solve complex mathematical problems. Pi observed the students, diligently working on equations, but they remained unaware of the true power it possessed.

One day, as Pi watched the students excitedly preparing for a Math competition, they couldn't help but feel a sense of curiosity. It started to wonder why its fellow symbols were held in such high regard while it seemed to go unnoticed. Determined to find answers, Pi embarked on a journey of self-discovery.

Pi began its quest by seeking guidance from the wise elder symbols in the school. They explained that Pi represented the ratio of a circle's circumference to its diameter. This revelation astounded Pi, as they realized that it was the key to understanding the fundamental properties of circles.

As Pi delved deeper into their newfound knowledge, they discovered that its value was irrational and infinite. No matter how many decimal places were calculated, Pi would continue infinitely without repetition. This made Pi truly unique among the other symbol. With newfound confidence, Pi decided to share its revelation with the other symbols. It explained that its value was not just a random assortment of numbers but held a deeper meaning. Pi represented the inherent perfection and harmony found within the geometry of circles.

The other symbols listened intently, amazed by this revelation. They realised that Pi was indeed special, possessing a beauty that surpassed their values. Together, they celebrated the significance of Pi and its role in unlocking the secrets of geometry.
From that day forward, Pi became revered. Students and teachers alike recognised its importance and integrated it into their equations and formulas. Pi's journey of self-discovery transformed it from an overlooked symbol to a symbol of great significance.
And so, in the school, the story of Pi spread, inspiring generations of mathematicians to embrace its uniqueness and acknowledge the extraordinary power it held. The unassuming symbol had finally come to realise its true worth and the impact it could make in the world of mathematics.

The Magic Of Math

1. SUPERMARKET MATH:

Picture this: you're strolling down the supermarket aisles, glancing at the enticing discounts and "buy one, get one free" deals. Math is your trusty companion, revealing the secrets behind these enticing offers. By understanding percentages and fractions, you'll become a savvy shopper, saving money while filling your cart with your favorite goodies.

2. KITCHEN MAGIC:

Have you ever wondered why Grandma's cookies taste so amazing? It's not just her secret recipe; it's the math she employs in the kitchen! From measuring ingredients with precision to adjusting recipes and setting the oven temperature just right, math transforms you into a culinary genius, ensuring every dish you create is a masterpiece.

3. MONEY WISDOM:

Finance can be daunting, but with math as your ally, you'll master the art of managing your money. Dive into the world of interest rates, budgeting, and financial planning. Math is your treasure map, guiding you towards wise financial decisions and securing your financial future.

4. TRAVEL CLUES:

The world is your playground, and math is your globe-traveling guide. Whether you're calculating the distance to your dream destination or smoothly converting currencies during your international adventures, math ensures you reach your travel goals without a hitch.

5. DIY SUCCESS:

Home improvement projects have never been this rewarding. Math steps in to measure furniture, calculate paint requirements, and make sure those wood cuts are precise. Whether you're building, painting, or crafting, math is your guardian angel, guaranteeing project perfection.

6. HEALTH TRACKING:

Your well-being matters, and math is here to support your health journey. From counting daily steps to calculating your Body Mass Index (BMI), math empowers you to make informed decisions about your health and embark on a path towards a happier and healthier life.

CHESS & CHECKERS

THE USE OF MATHEMATICS IN RECREATIONAL ACTIVITIES

Chess and checkers are two classic board games that have captivated players for centuries. While these games may seem purely strategic and based on logical thinking, they also heavily rely on mathematics. Both chess and checkers require players to analyze positions, calculate potential moves, and formulate strategies based on mathematical principles. This essay explores the role of mathematics in these recreational activities, showcasing how these games offer an enjoyable way to exercise mathematical thinking.

1. The Mathematical Foundations of Chess:

A. Chess, often known as the "game of kings," is renowned for its complexity and strategic depth.Every move in chess involves mathematical calculations, as players must evaluate various possibilities and anticipate the outcomes.
B.Mathematics comes into play when analyzing the number of legal moves available to each piece, calculating the value of each piece on the board, determining the positional advantage,and predicting the potential outcomes of a move.
C. Understanding concepts such as algebraic notation, coordinates, and geometric patterns helps players navigate the chessboard effectively.

2. Mathematical Principles in Checkers:

A. Checkers, a simpler game than chess, still requires a solid understanding of mathematical principles. The game revolves around capturing the opponent's pieces and strategically maneuvering one's own pieces across the board.
B. Players must calculate the number of moves available to each piece, consider potential jumps and capturing sequences, and evaluate the risk and reward of each move.

C.Counting the number of pieces on the board, predicting the outcomes of multiple moves ahead,and assessing the odds of success are all mathematical calculations that players must perform in.
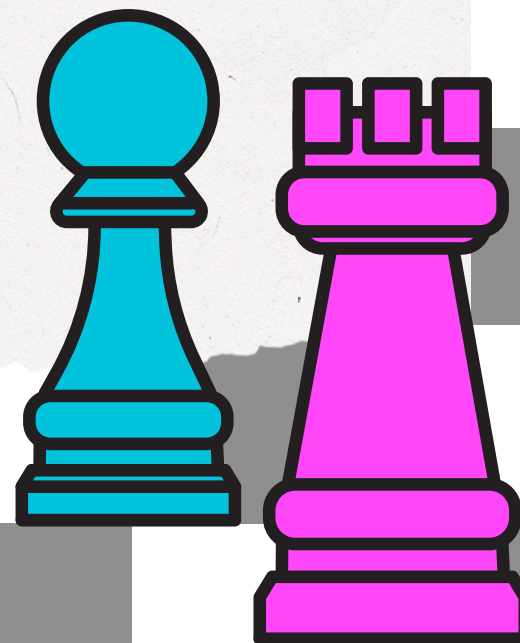
3. Probability and Statistics:

A. Both chess and checkers involve degree of uncertainty, which can be analyzed using probability and statistics. In chess, players often evaluate the likelihood of their opponent choosing a particular move, allowing them to anticipate and plan accordingly.

B. Similarly, in checkers, players can employ probability theory to determine the chances of their opponent making a specific move, leading to better decision-making.

4. Pattern Recognition and Logic:

A. Recognizing patterns and developing strategies based on them is an integral part of mastering these games. Mathematical concepts such as symmetry, transposition, and spatial relationships assist players in identifying patterns that can be exploited or defended against.

Conclusion:

These games require players to analyze positions, calculate possible moves, and develop strategies based on mathematical principles. By involving probability,statistics, pattern recognition and logical reasoning, chess and checkers offer an enjoyable way to exercise and enhance mathematical skills. Chess and checkers provide an engaging platform for recreational activities that stimulate mathematical thinking.

By Kairav Mehtani, 8D
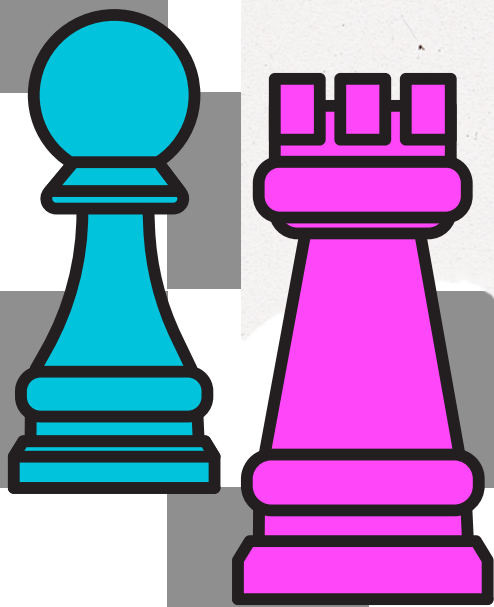
MATHEMATICAL MYSTIQUE

Fractals are geometric shapes that exhibit self-similarity, meaning that they have similar patterns at different scales. They are created through a process called iteration, where a simple shape is repeated and scaled down multiple times. This repetition leads to intricate and infinitely complex structures.

One well-known example of a fractal is the Mandelbrot Set. It's created by iterating a complex mathematical formula for each point in the complex plane. The points that do not escape to infinity form the set, and when graphed, it reveals an astonishingly beautiful and intricate pattern. The Mandelbrot Set exhibits self-similarity, as zooming in on any part of it reveals smaller versions of the same shape.

Fractals have a wide range of applications in mathematics and beyond. They are used in computer graphics to generate realistic landscapes, clouds, and textures. By using fractal algorithms, complex natural structures can be created, giving a sense of realism to virtual environments.

Fractals have a wide range of applications in mathematics and beyond. They are used in computer graphics to generate realistic landscapes, clouds, and textures. By using fractal algorithms, complex natural structures can be created, giving a sense of realism to virtual environments.

In physics, fractals are used to model and understand various natural phenomena. For example, fractal geometry is employed to describe the irregular shapes of coastlines, the branching patterns of trees, and the intricate structure of snowflakes.

Fractals have made their way into art as well. Many artists are inspired by the beauty and complexity of fractals and use them as a medium for their creations. Fractal art can take various forms, including paintings, sculptures, and digital artworks. The infinite complexity and mesmerizing patterns of fractals provide artists with endless possibilities for artistic expression.

Studying fractals can also deepen our understanding of mathematical concepts such as dimensionality. Fractals challenge the traditional notion of dimension, as they can have a fractional or non-integer dimension. This concept expands our perspective on the nature of space and shapes.

Exploring fractals can be a journey of discovery and wonder. It's like unraveling the hidden beauty and intricacy of the mathematical universe. Whether you're interested in math, art, or simply curious about the world around you, fractals offer a captivating playground for exploration.

So, go ahead and dive into the world of fractals! Explore their infinite complexity, create your own fractal art, or delve into the mathematical principles that underlie their mesmerizing patterns. There's a whole universe of beauty waiting to be discovered in the realm of fractals. It's like embarking on an exciting adventure, revealing the hidden wonders of self-similarity and infinite intricacy. Get ready to be captivated by the mesmerizing patterns and explore the boundless creativity that fractals offer. Happy fractal exploring!

By Sneha Priya Singh XI, A1

Albert Einstein's
RELATIVITY

By Shaurya Pandey, 7B

$$E = m.c^2$$
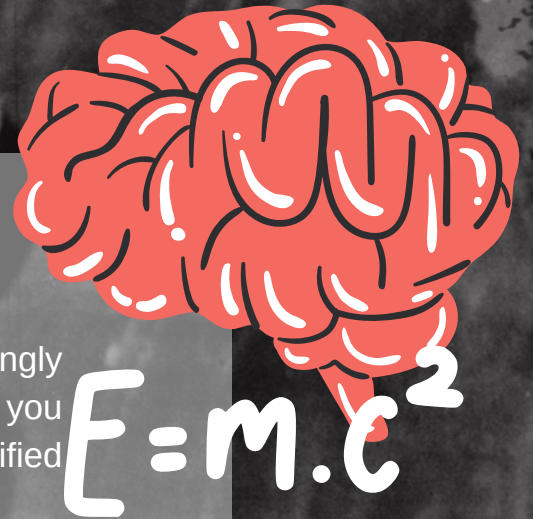
As complex as the theory of relativity seems to be, it's surprisingly simple. In short, I will explain what Einstein proposes to give you some insight. So, without further ado, here is my simplified explanation of the theory of relativity.

When we refer to the "theory of relativity",what we actually mean is general relativity.Special relativity is a "special case" of general relativity. The combination of these two principles helps explain many subjects varying from the motion of the planets and the effect of gravity on light to the existence of black holes.

Special relativity states that the laws of physics and thus the universe is the same for all equally "fast" observers. In the vacuum of space, the speed of light is a constant independent of any observer. But what about acceleration and gravity?

Einstein spent a decade musing on this. In 1915, he triumphantly produced his General Theory of Relativity. He determined that massive objects in space will cause warping or distortion of space-time which we all "feel" as gravity. In 1905, Albert Einstein developed his Special Theory of Relativity. His groundbreaking work invalidated centuries of accepted scientific thinking and changed how we perceive the world around us.In 1905, Albert Einstein developed his Special Theory of Relativity. His groundbreaking work invalidated centuries of accepted scientific thinking and changed how we perceive the world around us. This theory is only applicable for special cases.

That is, when both objects are moving with constant or uniform speed. Einstein explained that the relative motion of two objects should be the frame of reference rather than an external, esoteric, "etheric" reference system. By way of example, say you were an astronaut in a spaceship, observing another spaceship at a distance. The only thing that matters is how fast you and your observed target are moving with respect to each other. One snag, however, special relativity only applies if you are traveling in a straight line and not accelerating. If acceleration takes place, General Relativity needs to be applied. The theory is based on two fundamental principles:

- **Relativity:** The laws of physics do not change. Even for objects moving at inertial, constant speed frames of reference.
- **Speed of light:** It is the same for all observers regardless of their relative motion to the source of light.

Einstein's work creates a fundamental linkbetween time and space. We intuitively envisage the universe as three-dimensional (up and down, left and right, forwards and backward) but also with a time component or dimension. The combination of these makes the 4-D environment we experience. If you were to move fast enough through space, any observations you made about space and time would differ from anyone else moving at a different speed than you. As the difference between speeds increased, so would the observed differences.
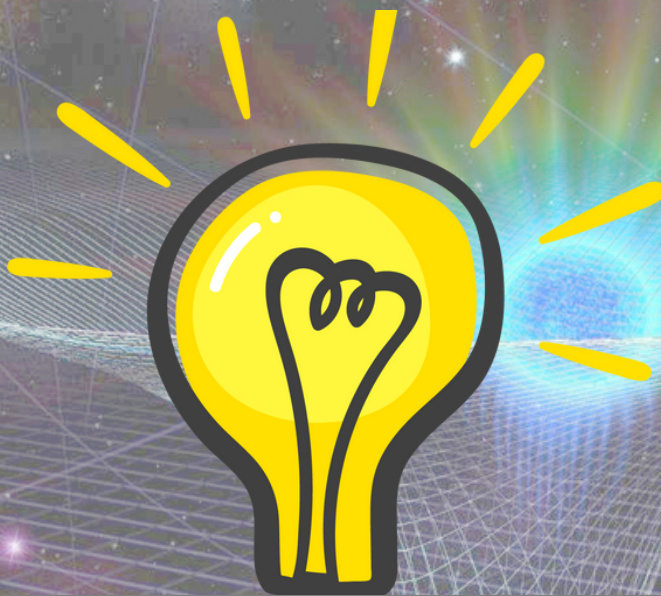
The Golden Ratio

By Guhan Gautam , 8G

The Golden Ratio- 1.618, it's a pattern observed in almost every natural thing in life, the swirling of birds flying through the sky, celestial entities like galaxies, distribution of sunflower seeds and much more! However, it is prominent and famous for its use in famous paintings, dating back to the Renaissance era of Europe. Leonardo Da Vinci, Michelangelo, Sandro Botticelli are famous painters from this era that reflected the Golden Ratio onto their paintings. The Mona Lisa, the most astounding and famous painting which was made by Da Vinci somewhere around 1503 to 1519 (still unclear when he painted it) utilized the Golden Ratio in the face of Madam Lisa Giocondo (the woman in the Mona Lisa). For centuries, the Golden Ratio is considered Perfect. If a persons face reflects upon the Golden Ratio, they appear to be handsome or gorgeous due to subconscious attitude. Da Vinci painted Mona Lisa so that Lisa Giocondo's face would appear perfect and flawless.

Michelangelo utilized the Golden Ratio in his famous painting "The Creation of Adam". In this painting, we can see that Adam (the person to be considered the first human) is being blessed by God himself. When we go into detail, we can see that in this painting, God's leg is proportionate with respect to the Golden Ratio to Adam's torso, this subconsciously makes us believe that the painting is, well, perfect of sort.

Diving into the history of this Ratio, we can confirm that Euclid and Pythagoras (philosophers of ancient Greece) were experimenting and studying this ratio for hours, making this a very old aspect of modern geometry and mathematics and of course, art.

To sum up whatever has been stated so far, the Golden Ratio is radical to art of the Renaissance period in a very beautiful manner. The ability to blend a mathematical formula into a piece of art is certainly a task of its own.

CHAOS THEORY
Unraveling the Secrets of Complexity

"It has been said that something as small as the flutter of a butterfly's wings can ultimately cause a typhoon halfway around the world"
~Chaos Theory

Chaos theory, a captivating branch of mathematics, delves into the intricate dynamics of complex systems, exploring their unpredictability and sensitivity to initial conditions. In this article, we will embark on a journey to understand the fundamental principles of chaos theory and its applications in various fields.

The Butterfly Effect

One of the most iconic ideas associated with chaos theory is the 'Butterfly Effect' This metaphorical concept suggests that the flap of butterfly's wings in Brazil could set off a tornado in Texas. In essence, it illustrates how small changes in initial conditions can lead to vastly different outcomes in dynamic systems. This notion underscores the sensitivity of chaotic systems to even the tiniest perturbations.

Key Concepts in Chaos Theory:

Nonlinearity

Chaos often emerges in nonlinear systems, where the relationship between variables is not proportional. Nonlinearity can lead to complex and unpredictable behavior, even with simple governing equations.

Fractals

Fractals are self-similar geometric shapes found in many chaotic systems. These intricate patterns are characterized by having similar structures at different scales, making them a hallmark of chaos theory.

Bifurcation Theory

Bifurcation theory explores how a system's behavior changes as a parameter is varied. It helps uncover the transition from ordered to chaotic dynamics in nonlinear systems.

Applications of Chaos Theory:

- **Weather Prediction**

Chaos theory has found applications in meteorology, where it is used to model and predict weather systems. While weather is inherently chaotic, understanding its underlying dynamics can lead to more accurate forecasts.

- **Physics**

In physics, chaos theory is applied to the study of complex systems like fluid dynamics, the behavior of celestial bodies, and particle physics. It helps explain phenomena that appear disordered.

- **Economics**

Economic systems are often characterized by chaotic dynamics. Chaos theory has been used to model financial markets, providing insights into market volatility and unpredictability.

By Ansh Mishra, 9A

PERSPECTIVE PROPORTIONS & PAINT

By: Sagarika Ghosh, 9D

The use of mathematics revolutionized art during Renaissance, empowering artists to craft the illusion of three- dimensional space and forms on flat surfaces. As painters delved deeper understanding perspective, they honed increasingly effective techniques. In Titian's. masterpiece, 'Diana and Actaeon,' he adeptly employs renowned methods like linear and aerial perspective.

However, these techniques took years of development. Until the late fourteenth century, painters predominantly relied on varying the sizes of human figures as one of several methods to convey significance within compositions. For instance, in Jacopo di Cione's 'Coronation of the Virgin' (1370-1), the saints, despite being uniformly sized, recede into the distance, with the Virgin Mary and Jesus depicted as the largest figures, signifying their paramount importance within the painting."

Sculpture VS Painting

The 'Paragone' was a competitive drive between painters and sculptors during Titian's era. Sculptors claimed superiority over painters because they could bring the entire human form to life, whereas painters only saw figures from a single point of view. Painters, however argued for their authority in the 'Paragone'as they had the ability to show the human form in all its three-dimensionality. Titian illustrates this debate with the various positions of Diana and her five nymphs that allow us to see the human form from many different directions.

Linear perspective

Linear perspective is mathematically constructed so that all receding parallel lines appear to converge towards each other, eventually meeting at a single point, the vanishing point.The horizontal lines of the columns and arch in 'Diana and Actaeon' demonstrate this method. Our eyes are guided in the direction of the vanishing point by other diagonal lines created by Diana and the three nymphs behind her, the top of the red curtain and Actaeon's arm. Another example of this technique is Carlo Crivelli's The Annunciation, with Saint Emidius.

Aerial Perspective

Leonardo da Vinci, among others, observed that as a landscape recedes from the viewer, the colours and tones become less contrasted and blend into the blue colour of the sky.The blue appearance of the sky is due to the fact that moving particles and molecules in the air scatter the shorter blue light waves, and this gives the overall impression that the sky is blue.Similarly, the blue light reflecting off the landscape and objects in the distance is scattered and thus gives the impression that they are also blue.This effect can be achieved in a painting by creating gradual tonal changes between foreground and background so that the land and objects in the distance appear blue.Because of the subtle gradation of colour required, the oil medium was best suited to achieving this illusion. The distant hills in 'Diana and Actaeon' show Titian's use of aerial perspective.

Maths & the Human Form

Artists like Titian learnt from the ancient Greek and Roman understanding of the proportions of the human form. Painters and sculptors flocked to Rome to study the recently discovered statues of the Roman Empire.Artists wanted to improve on their ancient predecessors and found this through their use of
mathematics. We know from Leonardo da Vinci's notebooks that he developed a mathematical system for understanding the proportions of the human body. For example, Leonardo da Vinci tells us that the distance between the middle of the nose to the bottom of the chin is half the length of the face, and the height of the body is the same as the width of outstretched arms. Titian's figures also illustrate this uniformity.

Foreshortening

Painters also used a technique known as foreshortening to strengthen the effect of linear perspective. By shortening the length of an object, the artist could create the impression that the object receded towards the vanishing point. We can see this in the foreshortening of Actaeon's arm.

The Mathematical Renaissance of Art

MY SODA CAN IS A CYLINDER
I LIKE MY SOLUTIONS AS INTEGERS
REDUCE THESE FRACTIONS TO SIMPLER
MAKE A PIECEWISE WITH MY SIGNATURE

MY MONEY DOESN'T HAVE X-INTERCEPT
PARALLEL LINES DO NOT INTERSECT
WAIT, HOL'UP SIRE I'LL INTERJECT

TAKING A TEST GET FULL CREDITS
HARD TO DIVIDE LIKE BY SEVEN
DIAMOND FLAWLESS GEOMETRY
GEOMETRY ALL IN 3 NOW INTO TRIGONOMETRY
NEVER MISTAKEN ZERO ERROR POLICY

KNOW THE PERCENTAGE LIKE PROBABLY
I'M INDEPENDENT, I'M EFFICIENT
YOU'RE CODEPENDENT, YOU'RE A COEFFICIENT
ALL THE ANGLES MATCHING LIKE MY EXTENSION

ME IDENTITY?
BRUH, SOLVE IT OUT CALCULATE
TO, THE NEAREST HUNDREDTHS PLACE
FROM SQUARE TO CUBE INTEGRATE
THE, DIFFERENT SIGNS CONJUGATE

DOUBLE FOUR, MAKE IT EIGHT
WHAT DO YOU MEAN I AM IN A PLANE
I DO MY HOMEWORK WHEN NOT AT HOME.

I GIVE IT OUT FACTS LIKE A PROOF
DERIVE OUT SQUARE FROM CUBE
MONEY LONGER THAN HYPOTENUSE
NEVER LOSE ALWAYS GAIN:)

~ ABHINYA TANWAR
IX-B

While God and mathematics may seem antithetical to each other, several noteworthy mathematicians, such as Pascal, Leibniz, and Gödel, have sought mathematical proof for the existence of God. A preprint study posted in 2013 stated that Gödel's logical reasoning was surprisingly accurate. However, mathematics is still far from disproving atheistic claims due to some flaws in Gödel's work. But before learning more about Gödel's proof, let's see what mathematicians before him had proved.

Firstly, Pascal established "Pascal's wager" in which he considered one case in which God exists and another in which he doesn't. Since anyone who doesn't believe in God ends up in hell if God exists, Pascal thought it better to believe in the existence of God since one wouldn't go to hell even if God were non-existent. However, primarily due to its opportunistic nature, his theory was discarded. Later, Leibniz stated that perfection is impossible to investigate. Thus, it was impossible to disprove that perfect properties could unite in one being. Hence, the possibility of a divine is real.

But Gödel was the only one who provided mathematically serious proof for God.

While it is beyond the scope of this article to detail Gödel's theory, understanding its flaws is crucial to seeing why it isn't perfect. Firstly, Gödel doesn't clarify what 'positive properties' can encapsulate, and his binary division of good and evil is also controversial. While Gödel's reasoning may be impeccable, his assumptions are doubtful. For example, if I read one good book by an author and assume all her books are good, the assumption is incorrect as many may not be enjoyable. Gödel's work exhibits somewhat of a similar fallacy. Moreover, the set that he created for this purpose is far from unique and can justify the existence of more than 700 divine entities differing in essence, making the set doubtfully justify polytheism. All this ultimately comes down to one thought: is mathematics the right way to prove divine existence? Even if it isn't, it opens our minds to the scope of mathematics in the oddest circumstances.

Can God Be Proven Through Math ?

BY RISHITA SINGH

Geometrical Magic

By Sanjana Bhanot, XI A1

Geometry played a crucial role in the development of ancient civilizations, and its applications were diverse and fundamental to various aspects of their society. Its applications involve architecture, agriculture, land measurement, astronomy, and more. Ancient Egyptians used geometry to design and construct the pyramids and other monumental structures. The precise angles and dimensions of the pyramids are examples of advanced geometric knowledge. Greek architects and mathematicians, such as Euclid, applied geometry to create classical buildings like the Parthenon which ensures structural stability and aesthetic harmony. In ancient India, geometry was employed in the construction of complex temple structures like the Kailasa Temple at Ellora which is known for its intricate geometric proportions. The ancient Egyptians also utilized geometry to survey and redistribute land along the Nile River after annual floods, which helped maintain accurate property boundaries. They made significant contributions to geometry and applied it to astronomy aswell. Pioneers like Hipparchus used geometry to develop the concept of celestial spheres and to calculate the positions of stars and planets. Various ancient civilizations, including the Phoenicians and Polynesians, employed geometry to navigate the seas. They used principles like spherical trigonometry to determine their positions, making long-distance voyages possible. In ancient civilizations like the Inca Empire, geometric terracing and canal systems were used for efficient irrigation and agriculture, maximizing the use of limited arable land. Geometry was also used in ancient military strategy and fortifications. The Greeks, for instance, used geometric principles to design the layout of cities and fortresses for strategic advantage. Geometry was a fundamental tool in these civilizations, aiding them in various aspects of their daily lives, from building grand monuments to understanding constellations. It reflected their advanced mathematical thinking and the practical applications of geometry in the ancient world.

The Reality of Pythagorean Theorem

The Pythagorean Theorem, formulated by the ancient Greek mathematician Pythagoras, is one of the most fundamental principles in mathematics. It states that in a right-angled triangle, the square of the length of the hypotenuse (the side opposite the right angle) is equal to the sum of the squares of the other two sides. The Pythagorean Theorem has a wide range of practical applications in our everyday lives. In this article, we will explore some real-life situations where the theorem is used

ARCHITECTURE AND CONSTRUCTION

Given two straight lines, the Pythagorean Theorem allows you to calculate the length of the diagonal connecting them. This application is frequently used in architecture, woodworking, or other physical construction projects. For instance, say you are building a sloped roof. If you know the height of the roof and the length for it to cover, you can use the Pythagorean Theorem to find the diagonal length of the roof's slope. You can use this information to cut properly sized beams to support the roof, or calculate the area of the roof that you would need to shingle.

LAYING OUT SQUARE ANGLES

The Pythagorean Theorem is also used in construction to make sure buildings are square. A triangle whose side lengths correspond with the Pythagorean Theorem – such as a 3 metre by 4 metre by 5 metre triangle – will always be a right triangle. When laying out a foundation, or constructing a square corner between two walls, construction workers will set out a triangle from three strings that correspond with these lengths. If the string lengths were measured correctly, the corner opposite the triangle's hypotenuse will be a right angle, so the builders will know they are constructing their walls or foundations on the right lines.

By Aminesh Kumar

NAVIGATION

The Pythagorean Theorem is useful for two-dimensional navigation. You can use it and two lengths to find the shortest distance. For instance, if you are at sea and navigating to a point that is 300 KM north and 400 KM west, you can use the theorem to find the distance from your ship to that point and calculate how many degrees to the west of north you would need to follow to reach that point. The distances north and west will be the two legs of the triangle, and the shortest line connecting them will be the diagonal. The same principles can be used for air navigation. For instance, a plane can use its height above the ground and its distance from the destination airport to find the correct place to begin a descent to that airport.

SURVEYING

Surveying is the process by which cartographers calculate the numerical distances and heights between different points before creating a map. Because terrain is often uneven, surveyors must find ways to take measurements of distance in a systematic way. The Pythagorean Theorem is used to calculate the steepness of slopes of hills or mountains. A surveyor looks through a telescope toward a measuring stick a fixed distance away, so that the telescope's line of sight and the measuring stick form a right angle. Since the surveyor knows both the height of the measuring stick and the horizontal distance of the stick from the telescope, he can then use the theorem to find the length of the slope that covers that distance, and from that length, determine how steep it is.

By Aminesh Kumar

MATH RAP

Math is cool, math is fun
You can solve problems one by one,
Add subtract multiply and divide
With math you'll have nothing to hide.

Math, math do not be afraid
It's just a game that you can play,
Numbers shapes and measurements too
There's so much to learn, so much to do.

Addition, subtraction, multiplication, and division
These are the basic tools, you got to make the right decision,
Solve equations, find the roots, and graph the functions
Use your mind, push your limits, and make the deductions.

Mathematics, it's the language of the world
Numbers and symbols, in equations swirled,
From algebra to geometry, we solve for X and Y
Calculating angles and measurements, we never lie.

Fractions, decimals and percentages
Are just some of the many incentives,
To master math, you must practice
And learn the rules, without the miss.

Geometry, algebra and more
Mathematics has an endless store,
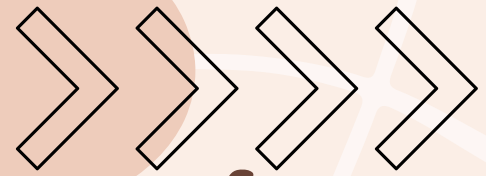Equations formulas and graphs
Can help you understand the math's craft.

Mathematics, it's everywhere
From science to finance,
It's the language of the universe
It's your chance.

So, let's embrace mathematics, and give it our best shot
It's a journey of discovery, and it's definitely worth the thought.

By MUKTA RANJAN SAHAY, HOD, MATHEMATICS.

BRANCHES
of Mathematics

Mathematics has five major branches; algebra, geometry, trigonometry, statistics and calculus. Here, I explain each briefly.

Algebra is the study of variables, and the rules for manipulating these variables in formulas. Elementary algebra deals with the manipulation of variables as if they were numbers and is therefore essential in all applications of mathematics. Abstract algebra is the name given, mostly in education, to the study of algebraic structures such as groups, rings, and fields. Linear algebra, which deals with linear equations and linear mappings, is used for modern presentations of geometry, and has many practical applications.

Geometry is a branch of mathematics concerned with properties of space such as the distance, shape, size, and relative position of figures. Geometry is, along with arithmetic, one of the oldest branches of mathematics. Geometry has applications in almost all sciences, and also in art, architecture, and other activities.

Trigonometry is a branch of mathematics concerned with relationships between angles and ratios of lengths. Mathematicians in India created the earliest-known tables of values for trigonometric ratios such as sine. Throughout history, trigonometry has been applied in areas such as geodesy, surveying, and navigation.

Calculus is the mathematical study of continuous change, in the same way that geometry is the study of shape, and algebra is the study of generalizations of arithmetic operations. It has two major branches, differential calculus and integral calculus; the former concerns instantaneous rates of change, and the slopes of curves, while the latter concerns accumulation of quantities, and areas under or between curves.

Statistics and probability are two fields that both use data to answer questions, but they do so in different ways. The field of probability uses existing known data to predict the likelihood of future events. The field of statistics uses data from a sample to draw inferences about a larger population

By Rushil Anand, 7D

Number THEORY

The famous mathematician and physicist Gauss quoted:

"Mathematics is the queen of the sciences, and number theory is the queen of mathematics."

Number theory, also known as "higher arithmetic", is one of the oldest branches of mathematics that. focuses on the properties and relationships of integers, or whole numbers.It deals with concepts such as prime numbers, divisibility, modular arithmetic, Diophantine equations, Algebraic Number Theory, Analytic Number Theory, Applications to Cryptograph (the science of secure communications), and more.This theory is experimental and theoretical. The experimental number theory leads to questions and suggests different ways to answer them, the theoretical number theory tries to provide a definite answer by solving it.

Uses in Day to Day life:

1. Credit Card Security: Number theory plays a crucial role in ensuring the security of credit card transactions through encryption algorithms that rely on prime numbers and modular arithmetic.

2. Digital Communication:
Error-correcting codes, which are based on number theory principles, help improve the accuracy of digital communication, such as sending messages over the internet or mobile networks.

3. Internet Security: RSA encryption, a widely used encryption algorithm, relies on the difficulty of factoring large numbers into their prime components, making it essential for secure online communication.

4. Passwords and PINS: When you create a strong password or PIN, you often rely on the fact that it's hard for others to factor or guess prime numbers or combinations.

6. Number Patterns: People often find beauty and fascination in number patterns, like Fibonacci sequences, which appear in various natural phenomena and artistic designs.

Overall, number theory's influence extends far beyond academia, impacting various aspects of modern life in ways that might not always be immediately apparent.

By ADESH KUMAR SINGH , 11A2

The Power of Mathematics in Business

By Vedantikka, 8E

There is no denying that math as a subject plays a pivotal role in our lives. Math is the base of any business; a business can't be successful with the sheer skill of creating a product or the talent of providing services. Looking over the finances of the company is essential for the survival of that business. Understanding basic math is necessary for profitable outcomes and accurate book keeping.

Knowing basic operations such as addition, subtraction, multiply, divide, round and the use of percentage and fraction is the least you need to price product and meet your budget. If math isn't your strongest pursuit, then I'd suggest you to find a partner or hire someone who can assist you with the finances of the company.

Mathematics is the unsung hero of the business world. While it may not always grab the headlines, it quietly underpins nearly every aspect of modern commerce. From startups to multinational corporations, math is the universal language of success in business. In this article, we'll delve into why math is so essential and explore its various applications in the corporate landscape.

1. Financial Decision-Making:

Mathematics is the backbone of financial analysis and planning. Whether it's calculating profits and losses, assessing investment opportunities, or managing budgets, math provides the tools and techniques needed for informed decision-making. Businesses rely on financial metrics like return on investment (ROI), net present value (NPV), and risk assessment models to make sound financial choices.

2. Data Analysis and Predictive Modelling:

In the age of big data, businesses collect and analyse vast amounts of information to gain insights into consumer behaviour, market trends, and operational efficiency. Math plays a critical role in statistical analysis, data modelling, and machine learning, enabling companies to make data-driven decisions and predictions that impact their bottom line.

3. Market Research and Consumer Behaviour:

Understanding consumer behaviour is key to effective marketing and product development. Math allows businesses to conduct surveys, experiments, and statistical analysis to gain insights into what motivates consumers and how to target their specific needs. This knowledge helps companies tailor their strategies for optimal results.

From Numbers to Success....

6. Pricing and Profit Margins:

Setting the right price for products and services can be a make-or-break decision. Math helps businesses calculate pricing strategies, considering factors like cost, demand elasticity, and competition, to maximize profit margins.

7. Operations Research and Efficiency:

Mathematics plays a pivotal role in optimizing business operations, from production processes to logistics and distribution. By employing techniques such as linear programming and queuing theory, companies can streamline their operations and reduce inefficiencies.

Conclusion:

Mathematics is the silent force that drives businesses toward success. It empowers decision-makers with the tools to analyse data, manage finances, understand markets, and optimize processes. In today's competitive business landscape, those who harness the power of math have a distinct advantage in achieving their goals and sustaining growth.

In summary, math is not just a subject taught in schools; it's a fundamental tool for achieving success in the business world. Its applications are diverse and pervasive, making it an indispensable asset for companies of all sizes and industries.

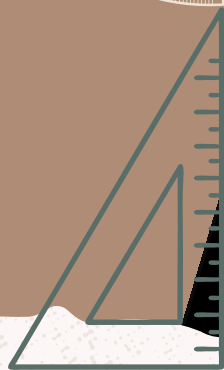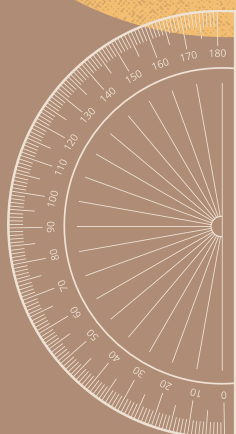*From Numbers to Success....*

THANK YOU FOR READING!
G.D.GOENKA PUBLIC SCHOOL, DWARKA

Máthēma

META

Issue 2 | December 2023

Indulge in fascinating articles, heart touching poem and the shared love for math

INITE LOVE FOR MATH

MATHOPHOBIA • INDULGE • CAREE

Mathophobia
learn how to beat the fear of mathematics and know that you are not alone.