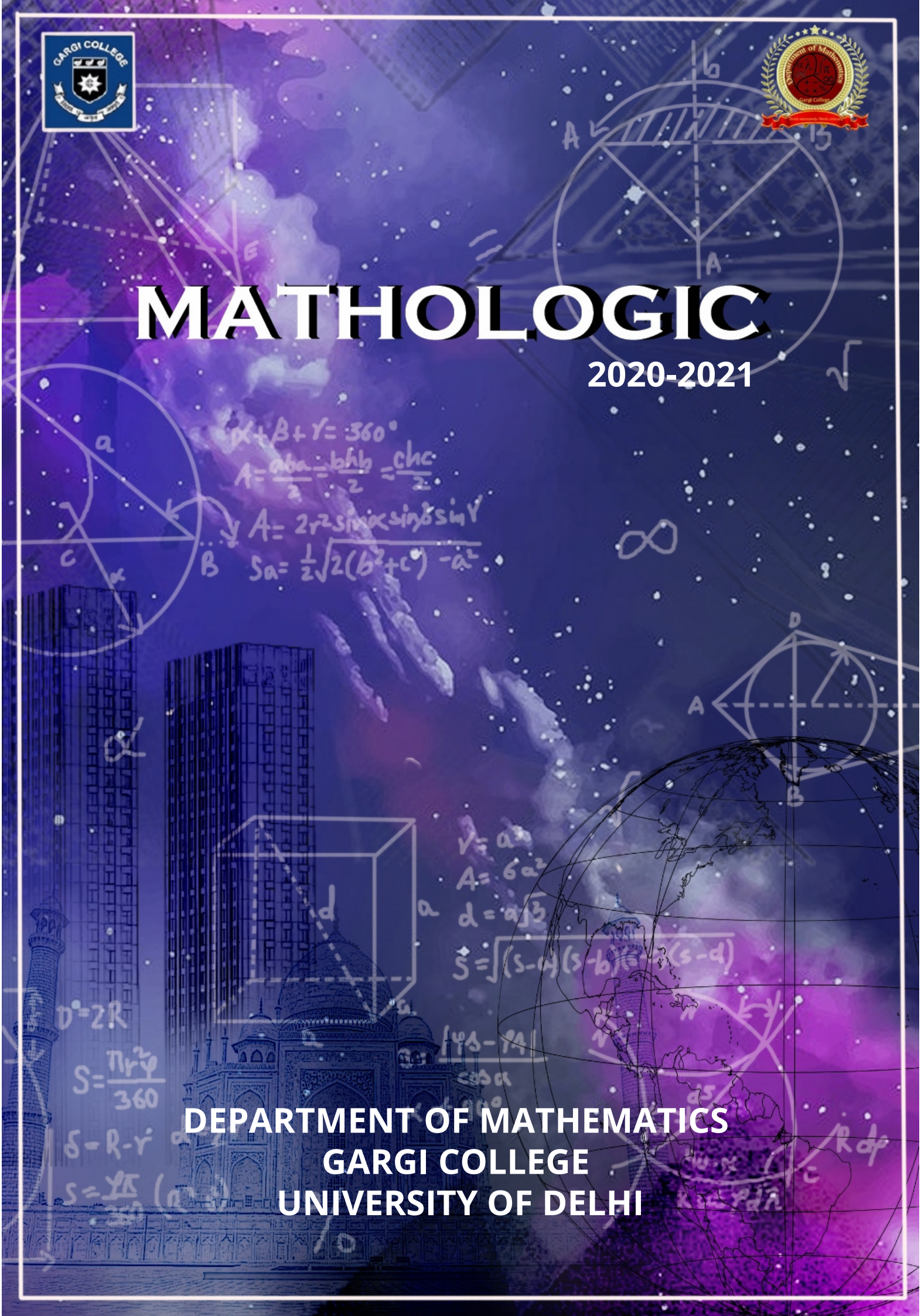

MATHOLOGIC

2020-2021

DEPARTMENT OF MATHEMATICS
GARGI COLLEGE
UNIVERSITY OF DELHI

To Our Readers,

This third edition of Mathologic brings to you the world of geometry, a well-known part of mathematics which is not just present in books. The magazine aims at bringing out the true meaning of geometry to its readers as well as highlighting geometry in those fields where you have never imagined it before.

In ancient times, people believed that God was the ultimate geometer and hence geometry was considered divine, often referred as 'sacred geometry'. Well, through this magazine we have tried to analyze some of the basic concepts of its divinity.

Many of us may have missed the vast applications of geometry in art, nature and many other things. So we hope Mathologic 2021 gives our readers the mirror to see this beauty of geometry.

The editorial board of Mathema could put together this edition despite the unfortunate circumstances faced in the year only with the whole hearted support, enthusiasm and contribution of the students of the Mathematics department, the creative team of the Union and other members of Mathema as well as the teacher advisors.

We believe we have done complete justice during the compilation of the magazine, keeping a balance to make your reading experience knowledgeable, interactive and interesting. We hope you will enjoy reading Mathologic 2021 as much as we enjoyed compiling it.

Regards

The Editorial Board

In loving memory

Mr. Narendra Kumar

Assistant professor,
department of mathematics, gargi College
(1985-2021)

The past academic year has been a tough hurdle for all students and teachers everywhere. Adding to all the difficulties, our department suffered a big loss, the untimely and sad demise of our TIC, Dr Narender Kumar.

He was a prolific mathematician, a supportive teacher and a loving colleague.He left a mark on the lives of everyone who has known him and will always be remembered by his students and his colleagues as someone who radiated knowledge and compassion. The mathematics department of Gargi college pays respect, gratitude and present this year's magazine in honour of our loved professor.

From the Principal's Desk

-Prof.(Dr.) Promila Kumar
Principal of Gargi College

We know you're a brilliant mathematician. What fascinated you to pursue your career towards mathematics?

Mathematics is a subject of logic which requires a massive brain exercise. Playing Sudoku, solving riddles and crossword puzzles has always been my favourite pastime. Such kind of brainteasers always fascinated me. This, probably is the reason that I got attracted towards Mathematics.

As per social norm, students tend to assume mathematics to be a challenging subject and they don't take it as their major subject. What are some myths that you would like to bust/break?

Yes, Mathematics has always been considered as a challenging subject because it needs concentration and 100% involvement in the subject. One can't afford to deviate from one's goal. But once you appreciate this, you will be surprised that you have started understanding the logic which makes the subject interesting and you would surely start loving it.

Being a principal of such a renowned college how has your experience been so far?

Becoming a Principal of a college of repute is a huge challenge because

- *You have to sustain the reputation of the college build by your predecessors.*
- *The college should grow further.*

If I talk about my experience, each day is a new learning. However, it has been a pleasant experience so far because of the simple reason that the faculty in Gargi is distinguished, staff is hard working and students are enthusiastic, loving and disciplined.

How has being a mathematics professor helped you in your journey as a principal?

As mentioned earlier mathematics is a subject of logic and a person with strong logic is able to handle complications conveniently and efficiently.

With E-learning becoming the new norm what were the challenges that you had to face and what positive and negative impact did it have on the students.

Yes, E-learning has become a norm in the prevailing circumstances but it will

continue like this is a big question mark. All of a sudden moving to online mode was a bit problematic but with the cooperation of the whole Gargi fraternity it was executed successfully.

Wi-fi connectivity in the campus had been enhanced, Zoom platform was purchased for a month to hold webinars and annual day. Later on Cisco WebEx platform was purchased for one year to facilitate webinars and big classes.

The negative impact is lack of physical interaction with students which is necessary for the holistic development. Moreover face to face teaching is more interactive and makes the subject interesting. Some students could not attend online classes due to certain limitations at their end and it's not convivial.

At the same time E-learning has made everyone technology savvy irrespective of age and profession. The ease of E-learning is a boon to students living in faraway places as it saves time and energy. Through e-modes it's much more convenient to organize and attend workshops, webinars etc. at inter-state as well as international level. Students could attend many online add-on courses along with their regular classes. Lastly OBE!!!! definitely it has become students favourite.

What are some career advices that you would like to give to the students of mathematics department of Gargi College.

After doing Mathematics at undergraduate level many career options are available such as:

- *Teaching at School or College level*
- *Masters in Mathematics and appear for Civil services exam.*
- *Pursue MBA or MCA*
- *Actuarial Scientist*
- *Operations Research Analyst*
- *IT industry*
- *Investment Banking*
- *Learn Coding and decoding and be an official hacker.*

-Interviewed by :
Nishtha Arora

Talk with a Mathematician

As Math is indeed a very unique subject, so are Mathematicians. Lately, we got a chance to speak to one of the renowned subject expert in Delhi. Following is an abstract from this conversation.

Interview with : Dr. Tanvi Jain

Associate Professor , Theoretical Statistics and Mathematics Unit , Indian Statistical Institute, Delhi

How can young mathematicians cope up with this explosion of knowledge and come up with something new?

No one can acquire everything. Excel in whatever you like, where your interests lie. It shouldn't be like "jack of all trades, master of none", that is, you know many topics but none in depth. Your goal might change over time but whatever your goal is, give in your full attention, which will even help you to learn new things.

Many young and talented people don't consider mathematics to be an exciting subject. Why do you think math phobia is so prevalent and what as mathematicians can we do to fix it?

Not to disagree, the mathematics that is taught in school and the college mathematics are different things. Mathematics is just taught as a theoretical subject because of which students don't quite like it. It's not just the work of teachers, but the work of all students, teachers, parents, society that can help make mathematics an interesting subject. This can be done by giving challenging questions that students get intrigued by and have an interest in solving. We need to give them time to think and understand the beauty of mathematics. It is indeed very difficult to make a school child understand mathematics; it is rather easy to teach that to a college student. So I believe two things need to be catered: showing the beauty of mathematics and giving them time to understand that.

A quote by Hardy says "Mathematics is a young man's game". Do you agree with this statement?

Well to say, I'm no one to comment upon Hardy, but to a big extent yes, I do believe this statement. Young people come up with new ideas and mathematics, in fact, any field needs a fresh set of ideas. But it is also true that there is no age bar to starting something fresh. You can be in your 40's and start something new and bring out a boatload of ideas.

People have a mindset that higher-level mathematics doesn't have application in real life. How would you counter their opinion?

Mathematics plays an important role at the back front. Its direct implication might not be visible to the public. Mathematics makes you flexible. It is the base with the help of which all the applications are built. If someone is good at mathematics, it is a direct implication that that person has a certain level of intelligence and the ability to think of logic. One can see physics or economics or other subjects in real life, but one cannot see the direct application of mathematics, for example, the geometric mean of matrices is used in brain interface, medical imaging, Google needs mathematics experts or number crunchers for the smooth functions and sorting of data. Even economics or physics or computer science Ph.D. holders need to have a good command of mathematics to work upon in their fields. This is how vast the use of mathematics in the background is, so one cannot neglect its importance.

Ma'am, we see you have a long list of publications wherein you have beautifully intermixed various topics of pure mathematics. What motivated you to pursue your research in these fields?

I've always enjoyed studying mathematics; I still enjoy it a lot. Every problem is like a game to me, solving them gives me satisfaction. People have various areas of interests like singing or dancing, in the same way, mathematics is mine, the area of problems attract me. Since school mathematics has been my favorite subject, although that time I didn't know I'd be researching this field, but it has always been my source of contentment

Ma'am, what do you think is the scope of mathematics in the future?

The scope of mathematics will soar in the future. In the future mathematics would be more of an interdisciplinary subject. For example, if you'd know computer science, you'd also know mathematics and vice-versa that is knowledge of one subject would also mean you know the other subject

related to it as well. Physicists being mathematicians and statisticians as well, this thing has always been prevalent but nowadays it's getting highlighted. As far as I see the trend going, I believe one would have to excel in various fields and not just one.

According to you how does pure mathematics differ from applied mathematics and in what aspects are they interlinked?

Pure mathematics and applied mathematics go hand in hand. They can't go independently. Neither one can do applied mathematics without having good knowledge of pure mathematics, nor can one go further in pure mathematics without knowing the formulas and applications of applied mathematics. Applied mathematics and pure mathematics always complement each other.

What do you think are the hurdles a student has to face while they pursue research in the field of mathematics from India?

One of the problems is that we have fewer departments and many mathematicians working in the same department, which even though is great exposure to students and motivates them to work hard, it at the same time also creates tough competition and fewer job opportunities. We should focus on giving individual attention. We need to have good mentorship, training and institute so that it helps students choose what they want. Another problem is, for instance, students who join corporate after college, start earning whereas students who pursue research don't. This is the reason that it is necessary to motivate a student to pursue research by providing good remuneration, facilities, equipment, and scholarships but then it is also the responsibility of the students to give in their best efforts and work as hard as students in corporate do. One other problem linked with it that we can't live an ideal life, everyone needs money. Students pursue research in fields where there are chances of earning money and not where their interests lie. If we could help resolve this issue and help them pursue research in their desired area of interest, it would be for the best.

When it comes to publications, do you think you've achieved your goals or is there still a long way to go?

I don't think I'll ever believe I have achieved enough and I have reached my goal and so I should stop. You stop once you get satisfied and as we all know human beings have the virtue of not being satisfied.

Ma'am, for your incredible work you've received numerous awards and recognitions and have proven to be a role model

for all women in mathematics, but, unfortunately, there still seems to be a lack of female representation in the subject. What do you feel about mathematics being a male dominated field?

If we talk about women's representation on a lower level, there still might be some considerable participation of women but as we go up the ladder, women's participation falls rapidly. I believe this is more of a mindset. People think that women can't do mathematics as it is a difficult subject because of which it gets difficult for a girl to overcome the stigma and go beyond it and excel in some field. It is believed that the best career for girls is teaching, which makes them limited to just bachelors or masters and hence not pursuing further research. A person should pursue teaching only if they like teaching and not because society thinks it is an easy career. It is also believed that if a girl studies masters and studies further, then she is beyond her marriage age which would hinder her social position and family life. We need to bring these problems to limelight, try to resolve them and help provide a level of security to women, which unfortunately still lacks in our society and is a big problem.

People these days are coming up with new ideas to help promote women education, like Indian Association for women which organizes workshop, scholarships, awards, etc. to improve women representation at various levels. I believe that along with the change in the society and support from our families, we also need to support ourselves, be strong enough to fight, and most importantly be mentally strong to do whatever we want to.

If you could give one piece of advice to students pursuing mathematics, what would that be?

Be focused, give your 100% to whatever you do. Don't always expect a return, you give your best shot, you will receive your best.

Interviewed by :

Nishtha Arora

From the Faculty Advisors

It gives us a great delight to introduce the third issue of our magazine 'MATHOLOGIC'. As Albert Einstein once said, "pure mathematics is, in its way, the poetry of logical ideas". The magazine is published annually with collective efforts of our students and teachers. It aims to encourage and enhance student's desire to discover logics of mathematics in their daily lives.
In this publication, we bring forth a spectrum of articles addressing various aspects of geometry to engage a curious mind. The edition will encompass the highlights of this academic year. Our special gratitude to the principal, Dr. Promila Kumar, for her ceaseless support and gracious guidance.

I extend my appreciation to Ms. Muskan Yadav with her entire editorial team for their spirited efforts. We express our sincere thanks to Ms. Shruti Agarwal, our students' council president and her team for their strenuous effort.
Progress is the key of life and to make it happen we must strive for excellence in both spheres of quality and quantity. Human mind is filled with endless curiosities and we are incessantly making endeavors to expand our reach and explore beyond known. This magazine is a perfect example of vision of scale, speed and skills. It glimmers the idea that we can be the best.

We wish for every accomplishment for all the students, as they strive to master the contents of this magazine and conquer new frontiers. Let us take inspiration from today's success and dedicate ourselves to accelerate our progress with unfaltering confidence.
Thank you and best wishes.

-Ms. Pooja Gupta (Convenor)

-Mr. Ramakant Prasad (Co-Convenor)

A word with the Union President

-Ms. Shruti Agarwal

We know you've been actively involved with the union for the past two years. What changes do you see?

When I started off as an undergraduate here, I wasn't even aware of the fact that 1st year students are allowed to be a part of the union. A lot has changed since then. We have better communication among the students of different years. I have seen a growing interest amongst the students. They are extensively showing participation in department activities. We have been able to organize a number of events that focus not just on theoretical math but its application as well.

As a president what goals had you envisioned for the department?

Before I became the President of our students' council, I held the post of proctor and I still remember my interview where I was asked as to what is it that I'd do differently if I were to be a part of this union, and my two primary goals were to improve the communication amongst the students of different batches and to have more application based events that will be of interest to not just a handful of students. And this year, even with the adaptation of online learning, we witnessed a huge participation from the first years for the students' council. We also had an informal session with them where we shared our own experiences so far, things that we've learnt the hard way and tried reducing the communication gap that persists among the students of different years. We organized a bunch of activities and events that focused on all round development of the students.

How would you motivate your batch mates and your juniors to multitask?

Prioritizing and time management are crucial when talking about multitasking. One should first figure out which tasks require immediate

.

attention and work accordingly. My advice would be to list down everything that needs to be done and try not to procrastinate. I try to write as much as possible. All that I've planned for the day, any updates so far, and strike it off once completed.

According to you what is the key to developing a good team?

When every member of the team is committed to their tasks, can cooperate with each other while complementing one another and is open to communication, it is only then that we can build not only good but a great team.

What are the responsibilities that accompany the power of the students' union?

It is crucial that one does not abuse their power. One should move forward keeping in mind the interests of not just themselves but the entire department. At times, things might get personal or complicated, and keeping an unbiased opinion is a must.

What impact and legacy would you like to leave on as the president of Mathema?

I urge them to focus on establishing meaningful goals and keep on working towards new opportunities. To never be afraid of speaking their mind and to have the ability to be bold, take risks and new challenges, and make something of their own.

What have been your leadership priorities at Mathema?

I've always tried my best to value every member's ideas and suggestions, make sure that the work doesn't pile up on any one person, keep an unbiased front at all times, and cater to the needs of the department students.

What motivated you to join the union?

I have always enjoyed organizing and managing events and initially that was the driving cause for me to join the union as a proctor. But once in, I realized there was much more that could be done, given the power and authority. And that was my motivation to be the President of the students' council so that I could put my ideas and thoughts into action.

What have you gained through the multiple roles that you've played in the students' union?

There has been a lot that has changed in me ever since I first joined the union. I am a much more confident version of who I was 2 years back. I have better communication skills, multi-tasking, leadership and management skills. I have also learnt to stay calm and focused at times of conflict.

Interviewed by -

Vishtha Arora

Editor's Angle

I am exhilarated to introduce to our fellow readers to Mathologic – The annual magazine of the Department of mathematics, Gargi College.

The magazine would provide a glimpse of various events conducted in the past year. The pandemic did not stop us from organizing a series of fun activities from Career counseling session to paper presentation. We also saw a huge footfall in the Chess tournament and the Article writing competition both allowing students to showcase their talent and creativity.

All the activities organized by the mathematics department witnessed an eager participation, hence making the value of organizing events that boost our department much more memorable and delightful.

We hope this magazine brings something fascinating for every reader, as it has for each of us involved in its making
Happy reading!

Muskan Yadav

Editor of Mathologic and Editorial Head (2020-2021)

MATHEMA

The Mathematics Association

2020-2021

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Ms. Pooja Gupta

PRESIDENT

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IT HEAD

Sanskriti Purohit

IT CO-ORDINATOR

Snehal

SPORTS HEAD

Snehal

ALUMNI HEAD

Nishtha Sharma

A POEM FOR GEOMETRY

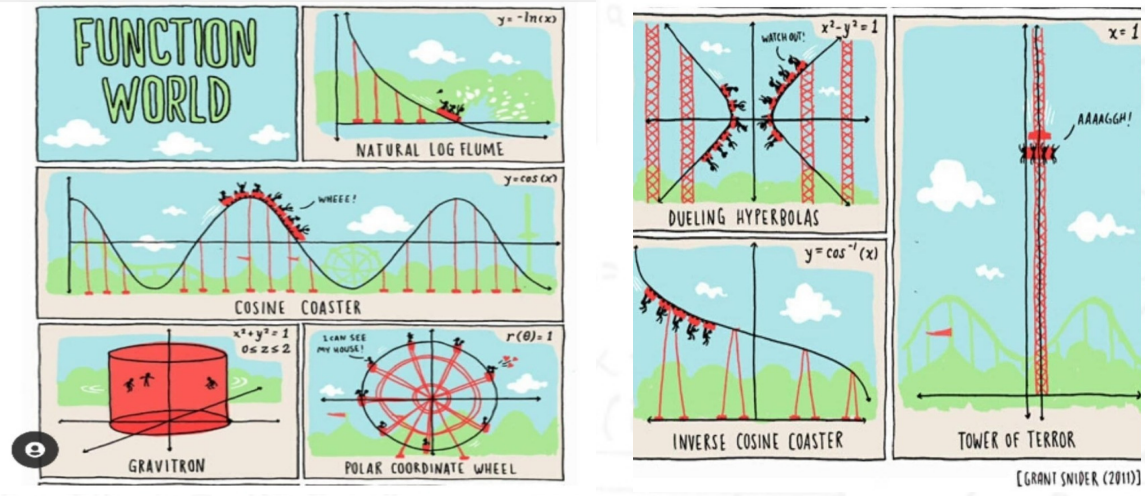
Isn't the sky and land like two parallel lines
Which never meet in real but falsely seems to entwine?
In scarlet, the silhouettes of city form different shapes
From three dimensional world, it turned into a two dimensional landscape.

Let's prove a theorem to find the happiness hidden in x,
And here it stops unproven leaving in dilemma what to do next?
Join the dots to disappear the chaos of life
And form a path to travel sequestering the agony of strife.

Combining the length of knowledge and emotions
And the breadth of several experience and ambitions
The equation of life is completed just like the figure of geometry,
Maybe geometry is science of life puzzled like the Shakespearean poetry.

Diya Bedi

(1st Year)



MATHCRACK

GEOMETRY: THE SCIENCE OF PLANE AND SPACE

The branch of mathematics that deals with shapes, angles, dimensions and sizes of a variety of things that we notice around us is recognized as Geometry. The basic meaning of the word 'geometry' is 'the measurement of Earth', as it is derived from the ancient Greek words; ‘geo’ means Earth and ‘metron’ means measurement. Thus, its concepts help us to understand the nature of shapes based on area and volumes in day to day life.

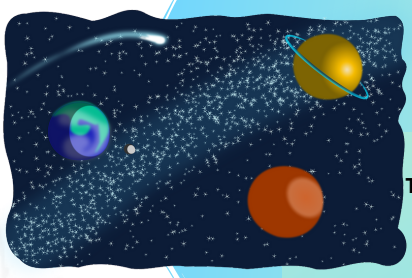
Geometry mainly comprises of 6 different branches:-

- Discrete Geometry – Deals with the relative position of simple geometric objects, like points, lines, triangles etc.
- Euclidean Geometry – Study of plane and solid figures based on axioms and theorems including angle, congruence, similarity.
- Differential Geometry– used in solving the problems of algebra and calculus.
- Algebraic Geometry – includes linear and polynomial algebraic equations that are used for solving the sets of zeros.
- Convex Geometry – uses techniques of real analysis for understanding convex shapes in Euclidean space.
- Topology – concerned with properties of space under continuous mapping.

The major applications of geometry are in the field of construction and surveying such as the construction of buildings, roads, dams and mapping. It is used in Software Industries for graphics designing, gaming and animations. Geometrical calculations between coordinates also help to chart a trajectory for a space vehicle's journey and its entry point into a planet's atmosphere. In the medical field as well, for CT scanning and MRI's, geometry concepts are used. Even, the satellite equipped with a GPS system uses it to trace the locations.

Though geometry has played a crucial role in the development of human civilization, it doesn't have any defined spot in working sectors but in last few years, the scope of geometry has been greatly expanding worldwide.

-Prerna Pranghal
(1st Year)



DO YOU KNOW ?

The Milky way

The Fibonacci pattern is found in spiral galaxies. The spiral arms of the Milky Way are description of a logarithmic spiral medsuring approximately 12 degrees. Beginning at the galaxy's center there are four major arms. Other examples are flowers, petals, DNA molecules. Geometry is hidden everywhere.

THE CHRONICLES OF THE ORIGIN OF GEOMETRY

The branch of mathematics called geometry first originated around 3000 BC in ancient Egypt. One of the main purpose for which ancient Egyptians sought help of geometry is to construct pyramids with four triangular sides and a square base.

After the Egyptians, the next known trace of geometry is Euclidean geometry in 300 BC. Euclid, the 'father of geometry', is rightfully called for he compiled a text in which he presented axiomatic format of his study in this field. The text contained the famous five postulates from which Euclid was able to derive a great portion of planar geometry.

It was in the 17th century that Rene Descartes discovered coordinate geometry. Following this discovery, calculus and physics developed to a much greater extent since coordinates and equations could be used now to illustrate proofs.

Later, Carl Friedrich Gauss, Nikolai Lobachevsky, and János Bolyai formally discovered non-Euclidean geometry in the 19th century. This geometry considers only four of the Euclid's first five postulates consistent. The last postulate that states that parallel lines do not meet was ruled out to be true. This idea of non-Euclidean geometry is one of the greatest driving forces behind elliptical and hyperbolic geometry.

Hence, the geometry as we know it today has gone through several additions, deletions and modifications. Throughout man's history, this field of subject has been of greatest significance. It will continue to remain so in the future too.

-Malavika M.S

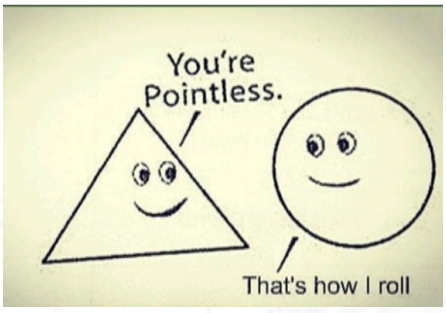
(2nd Year)

RELEVANCE OF GEOMETRY

The study of geometry starts with single points and branches out to lines and then to three dimensional shapes that are flat or solid. Squares, Circles and triangles are some of the simplest shapes in flat geometry. Cubes, cylinders, cones and spheres are simple shapes in solid geometry. The main concern of this new geometrical science is to characterize the structures and features of geometrical space in axioms and demonstration. Although it is quite clear that this revolution in geometry helped shape the scientific world such that contemporary mathematics remains incomprehensible without it, the questions of when, why and how this revolution took place, prior to this research, were still to some extent obscure.

- Pooja Kumari
(1st Year)

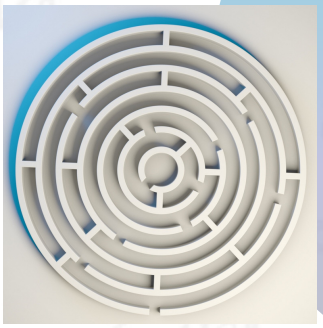
MATHCRACK



DID YOU KNOW?

Labyrinth

A Labyrinth is a combination of a circle and spiral to make a complicated path. The best known is in the story of the Minotaur, in Greek mythology.



GEOMETRY IN MUSICAL INSTRUMENTS

How does math sound?

Math is all around us, in everything we do. It is the building block for everything in our mundane lives, including mobile devices, architecture (ancient and modern), art, money, engineering, sports and even music. Yes, you read it right. Math has always been acknowledged as a difficult path full of hardships in the form of complex calculations revolving around numbers and thus this path is indeed tread by less people. But what people do fail to notice or, if I take the liberty to say, blatantly overlook is the fact that math is the basic component of life and is not always as complicated as one might make out it to be. As I recall Fran Lebowitz once said “In real life, I assure you, there no such thing as algebra”, and I ought to think that it summarizes the whole point.

Have you ever marveled over the fact that how does math sound? Yes, quite contrary of many onlookers’ belief, math does have a sound and why would it not have one after all it is used in the composition of musical instruments. To be more precise, geometry is the sound of math. How lovely isn’t it?

Geometry shapes the sound of music. Even through the ages, scholars have suspected that the mysterious force that shapes the melodies that catch the ear and lead the voice is none other than math. A trio of 21st-century music professors from Florida State University, Yale University and Princeton University have analyzed and categorized in brand-new ways the mathematics intrinsic to musical harmony.

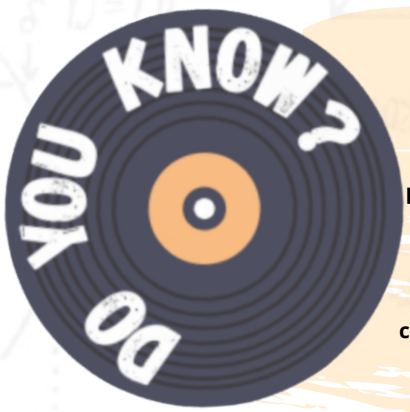
Their cutting-edge collaboration has produced a powerful tool they call "geometrical music theory", which translates the language of music theory into that of contemporary geometry. Geometrical music theory represents a culminating moment in the longstanding marriage of music and math. That marriage began when Pythagoras described pleasing musical intervals with simple mathematical ratios more than 2,600 years ago and which further evolved during the Middle Ages when deep thinkers used those same ratios to model the "music of the spheres"; what many at that time believed to be the literally harmonious movements of the sun, moon and planets.

Understanding and interpreting music is a process of discarding information, which in turn is the key to discovering its underlying mathematical structure. If one might go into details, it is revealed that at each level of abstraction, musical objects are grouped into families of chords or melodies. Mathematical structure is assigned to the "families" so that they can be represented as points within complex geometrical spaces in much the same way that "x" and "y" coordinates correspond to points on a two-dimensional plane in simple high school algebra. The different families produce an exotic maze of diverse geometrical spaces such as twisted triangular donuts and pinched cones -- and even some spaces that mathematicians haven't dreamed up names for yet.

Cutting it short, it can be concluded that math is indeed the soul of everything and does synchronizes with the nature with its beautiful harmony in the form of geometry.

-Prasahnsa Mewar

(3rd Year)



The rosslynchaple

13 geometrical sounds patterns were found to match 215 "musical cubes" in the chapel's pillars and arches. By sprinkling a metal plate with saltand utilizing the vibration of sound frequency the patterns may be created. The cube pattern corresponds to musical tones of a melody.

GEOMETRY AND ART

Mathematics and art are related in a variety of ways. For instance, the theory of perspective showed that there is more to geometry than just the metric properties of figures. (Perspective is the origin of projective geometry).

Artists have long used concepts of proportion in design. Vitruvius, a famous roman poet and architect developed a complicated theory of ideal proportions for the human figure. These concepts have been used and adapted by artists from Michelangelo to modern comic book artists.

The golden ratio is a particular proportion that has had a controversial role in art. Often claimed to be the most aesthetically pleasing ratio of lengths, it is frequently stated to be incorporated into famous works of art, though the most reliable and unambiguous examples were made deliberately by artists aware of this legend.

Tilings or tessellations (covering of a plane using one or more geometric shapes called tiles, with no overlaps and no gaps. In geometry, tessellations can be generalized to higher dimensions and a variety of geometries) have been used in art throughout history. Islamic art makes frequent use of tessellations, as did the art of M.C. Escher.

Cazanne, was a French artist and Post-Impressionist painter whose work laid the foundations of the transition from the 19th-century conception of artistic endeavor to a new and radically different world of art in the 20th century. He advanced the theory that all images can be built up from the sphere, the cone and the cylinder. This is still used in art theory today, although the exact list of shapes varies from author to author.

-Monika

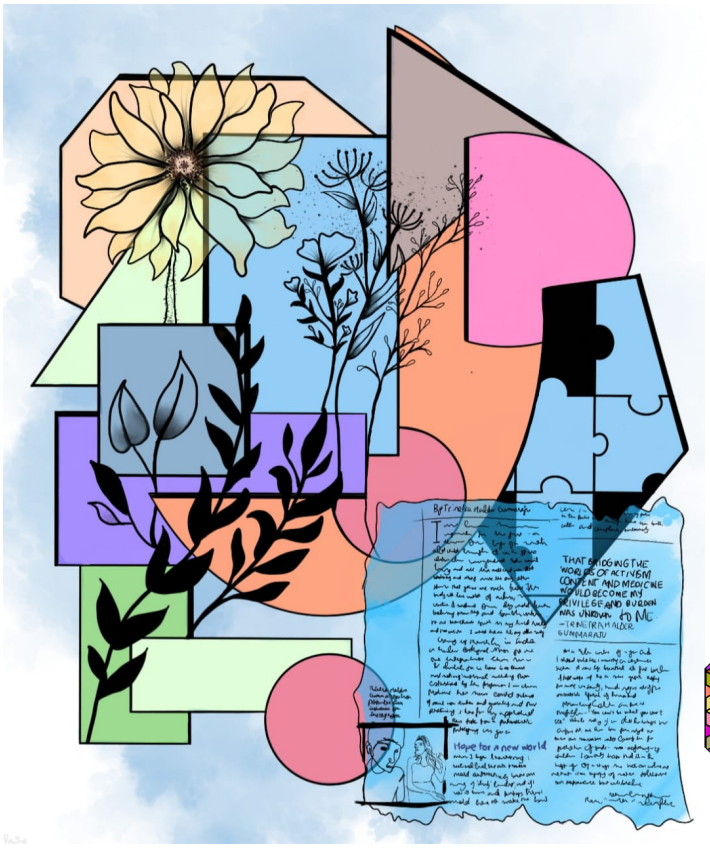
(1st Year)

DO YOU KNOW ?

Mona Lisa

Before beginning a painting, Da Vinci would lay out the sketches utilizing "DIVINE PROPORTIONS'. Sacred Geometry appears to be evident in the Mona Lisa since her face falls in line with the golden rectangle.

By creative team



GEOMETRY

AND

ART

GEOMETRY AS POEMS

Algebra was really tough
Next comes geometry
Equations to memorize
Will shape each new theory
Speaking of the shape of things
I hope my teacher cares
That I know the formulas
For trapezoids and squares
The area of circles?
I don't think I'd get by
Not knowing the radius
And the value of pi
Geometry's amazing
Do you know how to factor
All the different angles that
Are gauged with a protractor?
Get your compass out and draw
Circles that are perfect
Now get out your ruler and
Draw lines that intersect.

-Anshu Yadav
(2nd Year)

"What is a group ?"
"A symmetry of things."
"Of things from where?"
"Oh those from any place."
"But where in math?"
"In math? A Vector space."
"And what is that?"
"It's what a field brings."
"And what are fields?"
"They are the symmetries of groups."
"A group's own group?"
"Why yes, when both are one".
"So now we are back?"
"Indeed where we'd begun."
"So where to start?"
"Where you start any loop."
"And where is that?"
"From everywhere with in."
"And if you are out?"
"Then why would you begin."

-Rinku Verma
(2nd Year)

THE MATH OF KIRIGAMI

Kirigami, where Kiri stands for cut and kami for paper, is a lesser-known cousin of origami. This art form has found its way in pop-up cards, castles, books, etc., for ages. The Harvard researchers have exhibited a strong relationship between mathematics and old Japanese decorative traditions by coming up with a mathematical model that allows them to cut a kirigami sheet of paper in just such a way that it can be morphed into just about any 3D shape
For instance, consider gift-wrapping a ball or any spherical object, and you will quickly encounter the geometric abyss between paper's inherent flatness and a sphere's natural curves. As you will continue to wrap the paper around, the crinkles get bigger and bigger. Scientists have sought a systematic way of imbuing flat surfaces with curvature. Taking inspiration from tailors, how they wrap the fabric around the curves of a body by making the right cuts, the physicists put forth a basic set of rules for cutting and reattaching a piece of paper to add curvature to one point in its surface while subtracting it from another. This helps in maintaining the paper's overall flatness while forcing it to bend into the third dimension.

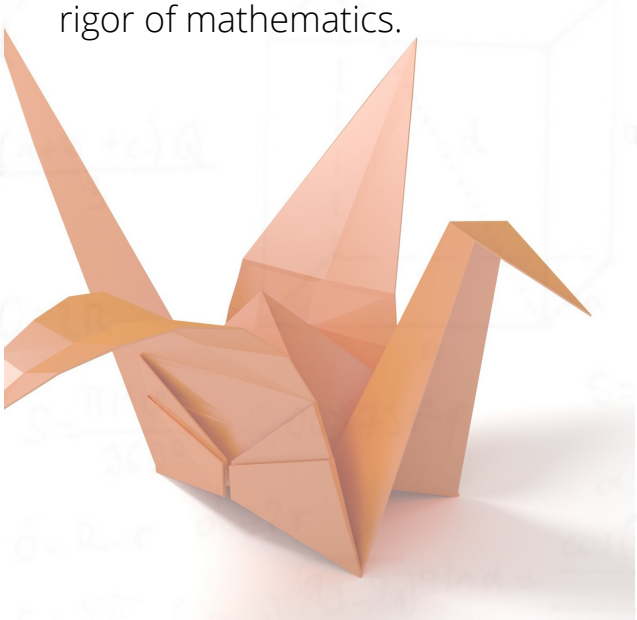
Nature has its way of doing wonders. Getting inspired by the work on sunflowers and influenced by how nature deals with the ball-wrapping problem, or the challenge of bending 2-D lattices of seeds, or leaves around curves, the Penn scientists treated their kirigami paper much like a hexagonal lattice of seeds. Over the course of hundreds of hours of cutting and folding, they discovered the rules for removing wedges from paper and gluing the holes closed to convert two hexagons into a pentagon and a heptagon, or a 5-7 pair.

To understand how this works, let's take an example of an insect crawling on a sheet of paper. Initially, the insect makes six 60-degree turns to complete an angular rotation of 360 degrees to return to its starting point, tracing out the shape of a hexagon having zero curvature. But if we remove a triangular wedge from the hexagon and paste the cut edges together, the paper is no longer flat. Now, the insect only needs to make five 60-degree turns to get back from where it started, a deficit that indicates that this pentagonal patch of the surface now has positive curvature. Nearby, the insect must make seven such turns, signifying a heptagon with an equal and opposite amount of negative curvature. Even as the paper's overall curvature remains zero, the 5-7 pair steps it up to a new plane.

The steps involved in converting a two or three-dimensional shapes into one motion are:

- Firstly, solve the problem by identifying the constraints that have to be satisfied to achieve the cut pattern.
- Determining the problem by using a numerical optimization approach.
- And lastly, experimentally verifying it. Kirigami had turned out to be a fresh and innovative approach for designing 3-D structures.

It has brought effective development in the construction of foldable shelter and housing for disaster zones, just by the closing of holes that have been pre-cut in paper or any other flat material.
The math of kirigami is nothing but inspiration taken from art, tempered by the rigor of mathematics.



-Muskan Yadav
(3rd Year)

PARADOXES

Zeno's Paradox

You will never reach point B from point A as you must always get half way there , and half of the half , and half of that half and so on.

Galelio's Paradox

Though most numbers are not squares , there are no more numbers than squares. First some numbers are squares, while others are not ; therefore, all the numbers, including both squares and non squares, must be more numerous than just the squares. And yet ,for every number there is exactly one square;hence, there cannot be more of one than of the other.

Cantor's Paradox

The set of all sets would have it's own power set as a subset, therefore it's cardinality would be at least as great as that of it's power set. But Cantor's theorem proves that power sets are strictly greater than the sets they are constructed from . Consequently, the set of all sets would contain a subset greater than itself.

Banach tarski

Cut a ball into a finite number of pieces and re-assemble the pieces to get two balls each of equal size to the first.

The Potato Paradox

If 100kg of potatoes, which (being purely mathematical potatoes) consist of 99% water , then when they'll consist of 98% water. Their weight will be 50kg.

Pigeonhole Principle

In mathematics, the pigeonhole principle states that if n items are put into m containers, with n>m, then at least one container must contain more than one item. This seemingly obvious statement can be usedto demonstrate possibly unexpected results.Given that the population of London is greater than the maximum number of hairs that can be present on a human's head, then the pigeonhole principle requires that there must be at least two people in London who have the same number of hairs on their head.

Russell's Paradox

Let R be the set of all sets that are not members of themselves.If R is not a member of itself,then it's definition dictates that it must contain itself, and if it contains itself, then it contradicts it's own definition as the set of sets that are not members of themselves.This contradiction is Russell's Paradox.

Grandi's Series

The sum of 1-1+1-1+1-1.... can be either one , zero or one -half.

THE GEOMETRY OF DANCE

Aren't dance and mathematics polar opposites? Dance is a fun activity - both to perform and observe. On the other hand, the general populace considers mathematics to be a dull and overly complicated source of constant frustration. But dance is all about changing the shape of our body to demonstrate an act, a feeling, or an idea and is it possible to talk of shapes without finding a concept of geometry hidden behind it. No! Hence the art of dancing is not only about spotlights, music, rhythms but also about geometrical concepts which we often fail to notice. Every aspect of choreography from basic moves, group formations to lifts and spins are full of concepts of shapes, angles and symmetry.

One of the most peculiar features of a beautiful choreographed dance is its symmetry, both of an individual dancer and that of the group. Including asymmetrical elements in the performance is a way to break the eye from the scene, or to demonstrate dissent within the piece. This power of symmetry is nothing but hidden geometry which is also, used in spins. While performing spins, dancers use a technique called 'spotting'. As they turn their body, they keep their head fixed for as long as possible, and then quickly rotate their neck to catch up with their body. This helps them to balance and prevent dizziness. The reason why dancers can't spin continuously, like a ball, is that the human body has no rotational symmetry, while a ball or any other spherical surface has infinite rotational symmetries. The human body has mirror symmetry which is used by choreographers to make the dance moves more attractive. In fact a choreographer, Rudolf Laban, has even created a dance, called Labanotation or as he himself described it, written dance, that manipulates body movements like a mathematical equation. His philosophy of "space harmony" is about spatial exercises linked to musical scales which flow through the structures of geometric shapes, such as the cube or an octahedron. He linked complex mathematical sequences, like the proportions of the golden ratio (phi)to movement and its relationship to human body proportions.

Modern dance also uses geometric concepts, but ballet's strict symmetry makes its commitment to geometry even more evident. The geometric shapes that comprise ballet's architecture and what they represent, is very often taken for granted. It seems there exists a sort of sacred geometry, certain principles which make these configurations penetrate in to the heart and soul of an individual. Considering the second act of Swan Lake as an example. Shortly after the swan corps enters, they form a formidable triangle, aimed like a spear towards the audience that defines the power of the flock. They then form circles around Siegfried in unity of their sisterhood. These shapes are not random formations—they embody the music's emotional and energetic charge. Thus, Geometry carries intention

The classical Indian dance known as Bharatanatyam, which is often characterized by its use of stylized, schematic body movements and sculpture-like poses also possesses a deep relation to geometry. Bharatanatyam dancers use poses and movement to convey ancient Indian stories from the Hindu epics Ramayana and Mahabharata. They often create basic geometric shapes – like the line, square, rectangle or triangle – with their bodies to tell their stories. These basic shapes have long been how we visually represent the world around us. The repetition of these shapes helps cement the elements of geometry in our minds.

Dance forms like Contemporary, Jazz, Tap Dance, Irish dance also have geometry playing a crucial role. Thus no matter what dance form it is or from what origin, geometry is always hidden in its moves. So the next time you skip a geometry class for dancing don't ever think that you're going away from it , instead you're getting closer to with each move.

-Anushka Raghav
(1st Year)

MATHEMATICAL MODELS

The reason we can talk to aliens is because of Math. Mathematics is a universal language which doesn't change anywhere in the universe.

When I heard this quote in a BBC documentary, it forced me to actually appreciate the beauty of mathematics and how universal it is in our lives. It can precisely represent every real-life situation and can be used to handle most of the complex problems. It does that with the help of mathematical modelling. The model describes our beliefs about how the world functions. We analyze this belief a real-life problem then into differential equations. Sounds interesting? I bet it does.

But how is it done? Well, it's simple. We take scientific laws or real-life world problems, analyze them and then translate them into differential equations. Let's understand this using the example of a population model. The population model gives a better understanding at how population change over time.

One of such models is exponential growth model put forward by Malthus. According to this model, "Once population size exceeds available resources, growth decreases dramatically." We analyze this statement and visualize it on a graph paper. We understand that (from the statement) population is increasing by a fixed percentage every year. We get a J-shaped curve given below for this model and this is known as exponential growth model.

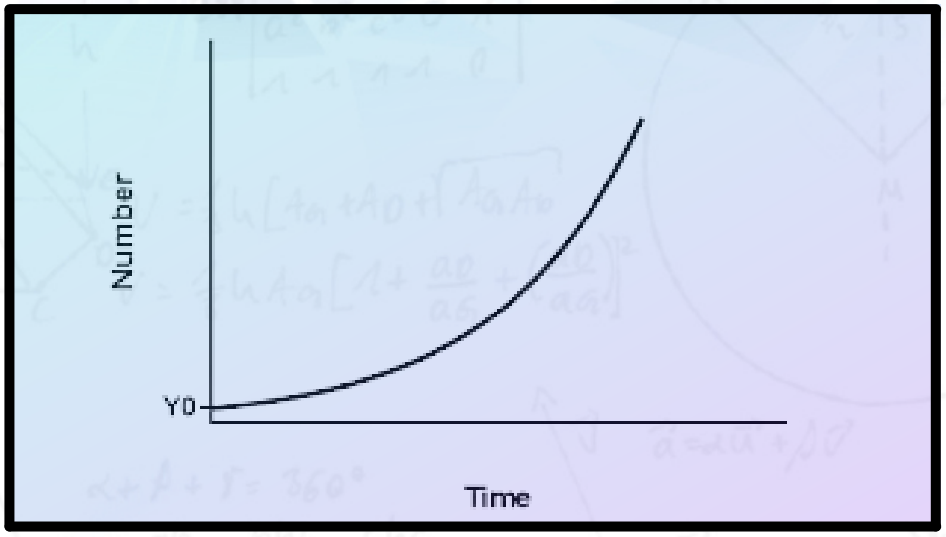


Image credit-"Exponential Growth Graph." Www.graphpad.com, 14 Apr. 2021, www.graphpad.com/guides/prism/latest/curve-fitting/reg_exponential-growth.htm.

This can be understood by the example of how population in bacteria change. Bacteria, we all know, reproduce by fission. To after every hour they'll double

i.e.,

At first hour		100 bacteria
	(let)	
Second hour		200 bacteria
Third hour		400 bacteria.
	.	
	.	
.	And so on.	

This is represented using $G=r\times N$ or $\partial N/\partial t=r\times N$
where birth and death rates are considered constant. This is known as exponential growth model.
Here, G (or $\partial N/\partial t$) is population growth rate, r per capita rate of increase and N is the population size.
That's how various mathematical models are formulated and help in understanding the dynamics of various real-life problems.

References -Population Growth Models. (2021, March 10). Retrieved April 14, 2021, from https://eng.libretexts.org/@go/page/12226

Vihavika
(1st year)

SHUFFLE THE UNSHUFFLED AND NOT GET IT SHUFFLED

Well it sound quite confusing. So let's make it a bit simpler .First of all we should understand what is shuffle(Perfect shuffle).

Take a pack of cards(ordinary deck of 52 cards) and split the pack into equal halves .Now interleave them perfectly: top card from the first pile ,top second card from the second pile, next card from the first pile ,next card from the second pile and so on. This is exact interleaving of two halves of the pack and called a perfect shuffle.

Everytime you have shuffled your cards, you must have got it in different orders. But what if after 'x' number of shuffles, we get the cards in original order ! Is it not intriguing? So let us find this 'x'.

What we are interested in here is the order of the cards in the original deck,so forget about the value of cards and label it from 0 to 51.
0,1,2,3,4,5,6,.....,50,51

A shuffle splits the cards into two halves, the top half in the first pile (0,1,2,3..... , 25) and the bottom half in the second pile(26,27,28,.....,51), and interleaves them to give the following order.

Label=position in original pack	Position in shuffled pack
0	0
1	2
2	4
...	...
25	50
26	1
...	...
50	49
51	51

The top card and bottom card with label 0 and 51 respectively remain in the same position while remaining cards are moved to 2n (mod 51) position in the shuffled pack.

Where n=label of cards in original pack.

2n mod 51=remainder when 2n is divided by 51.

Similarly ,after x shuffles, card will have moved to (2*2*2*....x times) n (mod 51) position

We are looking for x number of shuffles after which cards will return to original position i.e at position n.

$$=2^{x}n \pmod{51}$$

We are looking for x number of shuffles after which cards will return to original position i.e at position n.

$$2^{x}n(\text{mod } 51)=n$$

$$2^{x}(\text{mod } 51)=1$$

So,we are looking for smallest power of 2,which when divided by 51 gives remainder 1.

$$2^{8}(\text{mod } 51)=1$$

$$X=8$$

So,eight shuffles give us back the original pack.

Tareeshi

(1st year)

FRACTAL COSMOLOGY

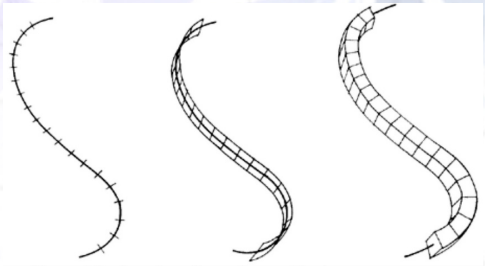
Some say it came into existence after a massive explosion. Some claim that a superior power created it. Well we cannot take any one parties side as of now because the study of how Universe came into existence ceases to end. As of now we, humans are only trying to study the structure of our mysterious but remarkable Universe with the facilities limited to our access.

Space as we know it, is boundless and infinite. Scientists all over the world are working hard to formulate the structure of the galaxies and planets in our Universe. The theory of Fractals has become an important tool in studying cosmology at a much larger scale. There are two divisions in fractal cosmology: Physical cosmology and Observational cosmology.

While observational cosmology is limited to theoretical conclusions about structure, evolution and origin of the Universe, physical cosmology is actually applied to describe practical relations.

In Physical Cosmology, fractal cosmology is a set of minority cosmological theories stating that the distribution of matter in the Universe is a fractal across a wide range of scales. Scientists use the fractal dimension of the universe or of matter distribution within it, when measured at very large or very small scales while studying about Cosmic Space. This model of including fractals in the study of cosmology was first made by Luciano Pietronero and his team in 1987. The large-scale distribution of galaxies is compared with fractal patterns as a basis to study further about the puzzling wonders of the Universe.

Added:
An important step in the understanding fractal dimensions is the introduction of the Hausdorff-Besicovitch dimension . It was first introduced by F. Hausdorff in 1919 and developed later in the 1930's by A. S. Besicovitch and his students. It revolves around the question- how do we measure the "size" of a set F of points in space? A simple manner of measuring the length of curves, the area of surfaces or the volume of objects is to divide the space into small cubes of diameter δ as shown below.



Small spheres of diameter δ could have been used instead. Then the curve can be measured by finding the number Nδ of line segments of length δ needed to cover the line. Obviously for an ordinary curve we have Nδ = L* / δ. The length of the curve is given by.

$$L = N(\delta)\delta \rightarrow_{\delta \rightarrow 0} L_* \delta^0.$$

In the limit δ approaches 0, the measure L becomes asymptotically equal to the length of the curve and is independent of δ.associating an area with the set of points defining a curve by obtaining the number of disks or squares needed to cover the curve. In the case of squares where each one has an area of δ2, the number of squares N(δ) gives an associated area

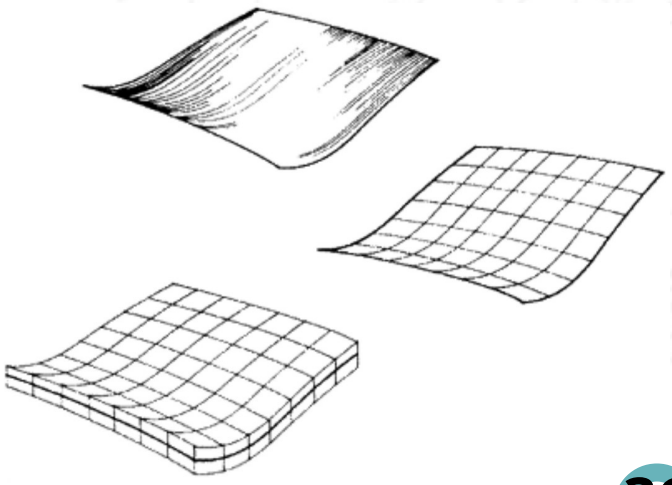
$$A = N(\delta)\delta^2 \rightarrow_{\delta \rightarrow 0} L_* \delta^1.$$

In a similar way the volume V associated with the line is given by

$$V = N(\delta)\delta^3 \rightarrow_{\delta \rightarrow 0} L_* \delta^2.$$

Now, for ordinary curves both A and V tends to zero as δ vanishes, and the only measure is the length of the curve. Now considering a set of points that define a surface as illustrated in the given figure. The normal measure is the area A, and so we have

$$A = N(\delta)\delta^2 \underset{\delta \rightarrow 0}{\rightarrow} A_* \delta^0.$$



Hence for an ordinary surface the number of squares needed to cover it is N(δ) = A*/δ2 in limit of vanishing δ, where A* is the area of the surface. Associating a volume with the surface by forming the sum of the volumes of the cubes needed to cover the surface:

$$V = N(\delta)\delta^3 \rightarrow_{\delta \rightarrow 0} A_* \delta^1.$$

This volume vanishes as δ tends to 0, as expected. Now, associating a length with a surface:

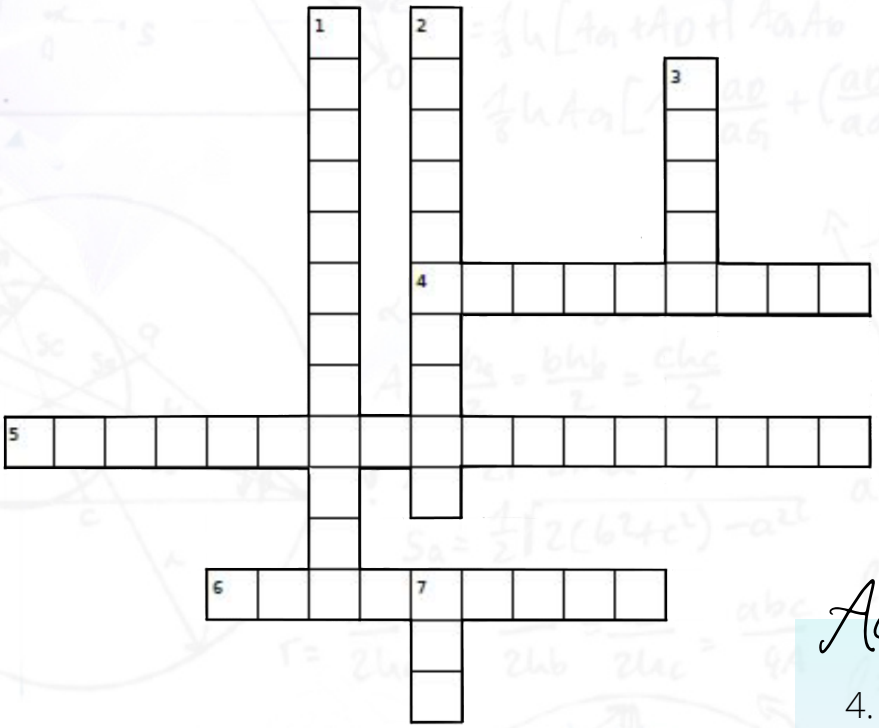
$$L = N(\delta)\delta \rightarrow A_* \delta^{-1},$$

which diverges for δ tends to 0. This is a reasonable result since it is impossible to cover a surface with a finite number of line segments. Therefore the conclusion: the only useful measure of a set of points defined by a surface in three-dimensional space is the area.

Anushka

(1st year)

MIND SCRIBBLE

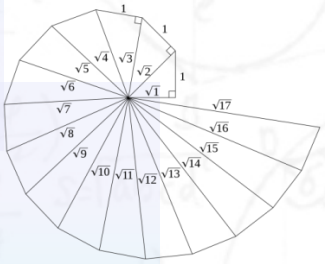


Down

1. Mathematician who invented descriptive geometry
2. Name of the infinity symbol
3. All the internal angles in miraculous pentagram are
7. Number of parallel sides in the asymptotic triangle

Across

4. The Earth's radius gets larger by 1 meter, as a result its equator increases by_____
5. The geometrical structure depicted in the picture is called



6. During a full 24-hour day, the hands of a clock will overlap _time

What 5-digit number has the following features:

If we place an extra numeral 1 at the beginning, we get a number three times smaller than if we put that numeral 1 at the end of the number?

Answer: 42857

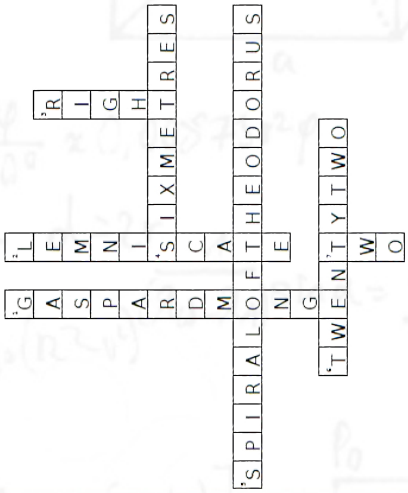
When asked about his birthday, a man said, "The day before yesterday I was only 25 and next year I will turn 28." This is true only one day in a year, when was he born?

Answer: He was born on December 31st and spoke about it on January

Find a number with its letters in alphabetical order.

Answer: Forty

SOLUTION



The winning article by Rashika Pandit (B.Sc (H) Mathematics, 3rd year, Gargi College) from the Article Writing Competition hosted by the department

RELEVANCE OF STUDY OF MATHEMATICS IN OTHER SUBJECTS

यथाशखामयरूाणां, नागानांमणयोयथा।
तववेदागशााणांगणतमधूनिथतम।।

Like the crest of the peacock,
Like the gem on the head of a snake,
So is mathematics at the head of all knowledge.

Mathematics is one of the most famous subjects. It is the story of logic and reasoning which has been passed on from generations to generations, since time immemorial. The range of applications that mathematics has is: incredible. It's comparable to the range between the size of a virus and the planet, Jupiter! We use mathematics in every aspect of life: from waking up in the morning and watching the time to calculate whether we'll get late for our work - to - dividing the bill amongst our friends - to - using Google to search something or the other. Mathematics is omnipresent. Even while studying subjects other than mathematics, knowingly or unknowingly we use mathematics.

Let's try to explore some of the uses of mathematical concepts in different areas of human knowledge and appreciate the intricate intertwining of mathematics with other subjects.

Starting with Physics: If two subjects are really inseparable then it's definitely Physics and Mathematics. From the calculating speed, velocity and acceleration using simple formulae or deriving them using calculus, finding the focal length of a lens or building a telescope using the lens, finding the frequency of an oscillating pendulum or predicting the existence of a heavenly body like Neptune just by calculation! These and a lot other concepts of physics have a mathematical base.

Fine arts helps us visualize the wonders that mathematics has in it. Optimization: the concept of optimum usage comes into play for making paintings by using medium based paints like oil or water. Perfect amounts of medium and color bring out the best in the paintings and help them survive long with the artwork being still vibrant. Also, concepts of ratio, proportion, symmetry, geometry, tessellation, fractals etc. have beautifully helped the artistic world blossom to its fullest. Together art and mathematics have created the aesthetic world that we proudly live in!

In Chemistry: As per law of conservation of mass, in a chemical reaction, the mass of reactants should be equal to the mass of products. So every chemical equation must be balanced... and arithmetic (a part of mathematics) ensures this. Forming the basics, the periodic table, having more than 100 elements, that differ from each other due to number of nucleons in present them to some advanced areas like understanding behavior of solids, liquids and gases using graphs and preparing semiconductors using the idea of ratios and proportions for desired optimal result, mathematics takes care of everything.

Commerce and mathematics go hand in hand. Trade, check on GDP, formulation of economic policies, accounting, etc. without mathematics will be reduced to just theory with no practical use. Even common activities like buying and selling items will become difficult!

Mathematics in Agriculture plays a very crucial role. The idea of optimization is fully exploited in this area. Starting from deciding the best season for growing the crops and the optimal area for doing the farming, and to ploughing, sowing seeds, irrigating and harvesting them; each and every step is completely based on the concept of optimization. How many seeds should be sown in a particular area and would be irrigated at what frequency to result in bountiful harvests thus maximizing the profits!

This modern era that we live in, is due to the use of mathematics in computer science (CS). Binary math, logic, counting, probability, recurrences, graph theory and discrete math form the foundation of this subject. Computers, mobiles, security systems, robots, etc. are some invaluable products of this union of math and CS. Had it not been the use of math in CS, learning across the world, in the pandemic of 2020 would have come to a halt. Thankfully, it has not.

Mathematics in sports is omnipresent. From the technique of playing a sport like calculating the perfect angle to hit the ball to marking the perfect running track to predicting the result of a cricket match by DLS if raining interrupts it and till the final result is announced in all the other sports, math is used everywhere vividly. Chess is the most beautiful example of a mathematical sport!

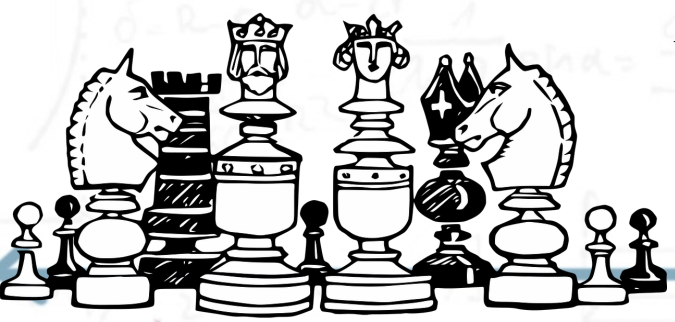
At first, it's difficult to imagine the purpose of a subject like mathematics in language. But, when observed, words are the base of language, and syllables are the building blocks of words. And it is the perfect pattern of syllables that give poems and other literary pieces their beautiful and melodious flow, which is covered under the area of arithmetic.

Last but not the least, let us see what role mathematics plays in the subject of History. It can be clearly observed that history without dates and timelines is illusion and timelines without mathematics is confusion. Ancient, medieval and modern ages are there because math helped us to differentiate them on the basis of calculation of dates!

Thus, it can be said that those who have completely understood the various concepts of mathematics can excel at any subject because every subject contains some or the other applications of mathematics in it. If all the other subjects are bricks, then mathematics is the sand that gives them their base and helps us construct our serene world.

Mathematics is the language in which God has written the Universe.

- Galileo Galilei



GEOMETRY In NATURE

Are you one of those who are fascinated by the beauty of spirals in a pine cone or the petals of a flower? Are you too amazed by the symmetry you find in things like starfish or butterfly or snowflakes? Despite the common stereotype of Mathematics being a dull and cold subject, it also has many fascinating applications in the nature. Even with something as basic as human face, which is the most fundamental part of nature, one can find Mathematics in it. Be it the curve or the longest river of the world or the distance between those two stars one may stare every night, mathematics never fails to create miracles when it comes to nature.

We can understand the order of the universe by studying the patterns that emerge from it. Even something as seemingly random as the shape of a trees branch has an order. The main trunk of a tree will grow until it produces a branch which has two growth points and each stem branches into two. This pattern is repeated for every new stem. Many birds use celestial objects like the Sun or stars to navigate their flight path and this requires some trigonometric calculations. But it's not that they're calculating these things consciously. Animals simply do what comes naturally to them. Spider web also illustrates a beautiful geometric pattern. The spider creates this structure by performing simple and innate steps. Honeycombs show a specific regular pattern of repeating hexagons. This design is highly efficient that it uses least amount of wax to store the honey.

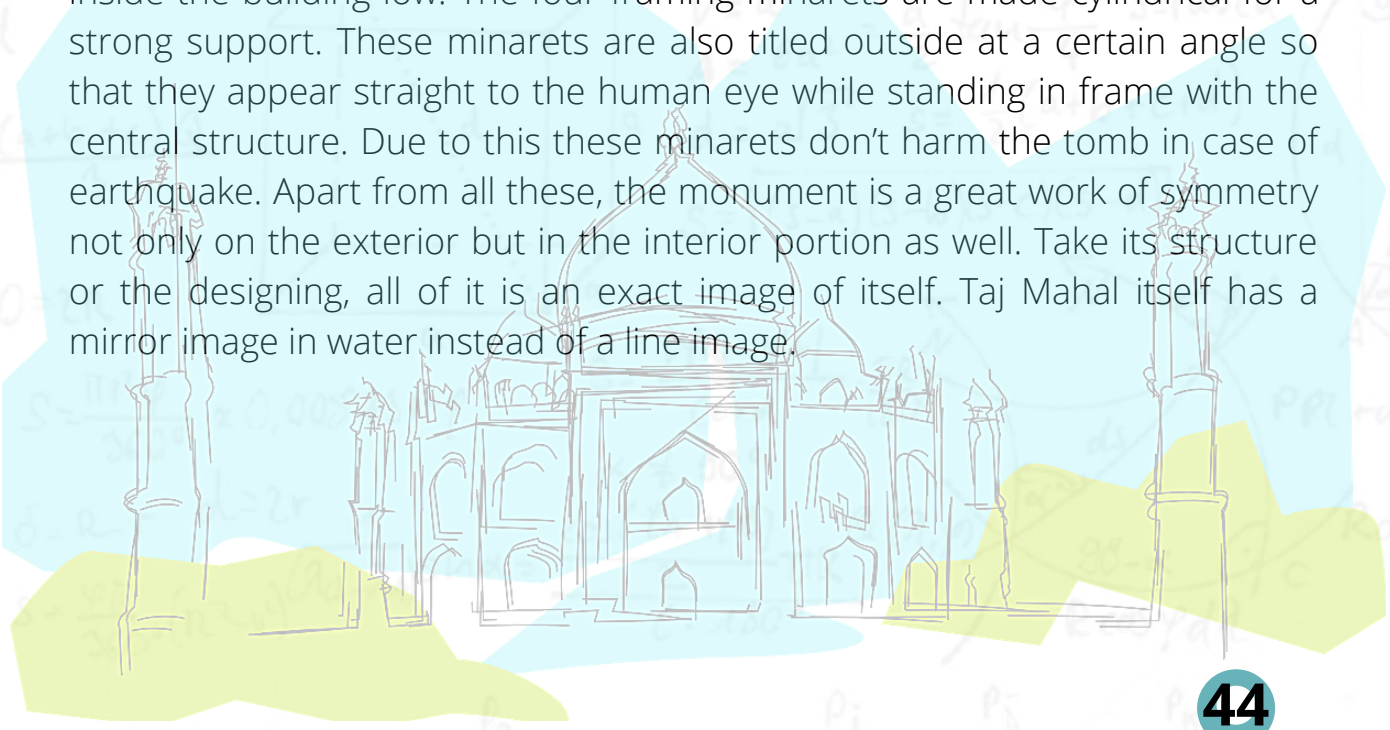
In fact, every natural occurrence carefully inspected reflects the beauty of geometry at its best. For example, soil erosion can cause flat rock surfaces to form that are almost perfect rectangles. This natural phenomenon is termed as ' tessellated pavement'. So it is very important to realize that geometry is one of the most interesting yet most common subject that we come across. So next time, you study co-ordinate geometry or congruence, take a glance outside your window and you might find a perfect example to understand your topic.

-Editorial Board

GEOMETRY IN MONUMENTS

Who didn't fall in love with the beauty of Taj Mahal or wasn't fascinated by the Eden project in the United Kingdom or didn't have a jaw dropping moment on seeing the pyramids of Giza. These are just three of the many excellent examples of splendid architecture around the world, from structures as old as the Parthenon in Greece to as new as the London city hall the world today is filled with architectural wonders. But, ever wondered what exactly was the secret behind building such enormously huge and beautiful structures? Is the choice of building material or their color? No, it's geometry. Geometry is a portal that allows objects to pass into the physical world from the world of drawing, making it the very base of all the architecture in the world.

Taj Mahal is not only an architectural masterpiece but also a symbol of love and one of the finest art to treat your eyes. Its structure is based on the principles of repetition and reflection. The central tomb is a cube whose corners are chopped to give it an octagonal interface. The hemispherical dome is not only the beauty factor but it helps in keeping the temperature inside the building low. The four framing minarets are made cylindrical for a strong support. These minarets are also titled outside at a certain angle so that they appear straight to the human eye while standing in frame with the central structure. Due to this these minarets don't harm the tomb in case of earthquake. Apart from all these, the monument is a great work of symmetry not only on the exterior but in the interior portion as well. Take its structure or the designing, all of it is an exact image of itself. Taj Mahal itself has a mirror image in water instead of a line image.



Another great work of symmetry and proportions depicting the brilliance of Greeks geometric principles is Parthenon. This temple of goddess Athena is a great piece of golden ratio. Another artwork of the divine proportion is the Pyramids of Giza. These three pyramids stand on a square base with equilateral triangles on lateral sides. If we cut the pyramids, obtaining the Egyptian triangle we will find the ratio of the slant height to the half of the base will result in the golden ratio. It is also said that the perimeter of the base(square) of the Great Pyramid is equal to the circumference of a circle whose radius equals to the height of the pyramid.

The spherical geodesic networks of Eden domes are just out of a fantasy world too. This structural network consists of concentric spherical networks with a radius difference forming an external and internal networks interconnected by diagonals. Talking about fantasies what can be more alluring than a room with no front or back. The City Hall of London is designed as a modified sphere which reduces the surface area of the roof causing a reduction in the exposure to the sunlight. And in winters due to less surface area, less heat escapes as compared to a cubical room of same volume. The floor plates are placed in a decreasing order with the decrease in the height forming a natural shade of the floor under it.
Early men used to live in caves, who would have thought that a shelter could be this fantasizing. Geometry is a tool to create anything and say everything. From pens to swords, rooms to manors, electric bulbs to atomic bombs all these require the study of shapes and placement and that is the importance of geometry for us to live. In fact, life is like a polygon which has infinite corners, and at every corner we grow, we learn, we live.

-Editorial Board

DO YOU KNOW ?

The Great pyramid

A lesser known fact is that the Euler number is hidden in its dimensions. It approximates the squaring of the circle. Its exact dimensions follow a formula in relations to the cubes of specific integers.

Conversation with an Alumni

-Ms. Garima Kumar

What role does Gargi play in your life, how has it shaped your personality and your professional path?

Gargi: when I hear this word, all I can think of are the millions of memories that I made in this place. It definitely holds a very important role in my life, it has shaped my personality to a great extent. Gargi has made me confident and smart that I can take any decision on my own without giving any thoughts. Not to say how supportive my friends, the environment and nonetheless the teachers of Gargi are, they've always helped me, guided me in everything, at every step. So in conclusion I'd say, Gargi would be the most important and the best decision that I've made.

What are the hurdles that you had to face while prepping for your entrances and how did you overcome them?

Start with anything, you would have your up's and down's.

While I was preparing for my entrances it was very difficult for me to manage college, entrances and travelling all together but whenever I used to have any issue, I used to go to my teachers and my friends, ask for help and like always they used to help me, guide me, provide me references. But overtime, you learn to manage things, get accustomed to it and you learn prioritizing things which I believe is one of the most important thing.

What made you chose BM as your career? Did you consider having some prior work experience?

I was more inclined towards corporate world and learn about all the domains of it and having Maths Hons. in addition as my bachelor's course made it difficult for me to get into corporate sector and pursue what I wanted so this gave me the reason to choose MBA and sit for entrances. As far as work experience is considered, had I not cleared my entrances or got into a good B-school, I would've tried for work experience wherein I could explore and learn the domains of corporate sector.

How has your experience in XLRI/BM been so far?

From bachelors to masters to job, there is a huge shift in life whatsoever you do.

Initially it was very difficult for me to manage my MBA and my final year examinations that were happening simultaneously where MBA was no less at all! So many deadlines, no extensions, summer internship, that I became sceptical of my course that I had taken up. But eventually you get accustomed to 3-4 hours of sleep, to uncertainty, and different things. Overtime you learn the things hard way.

Now that you're in XLRI, a college of repute/one of the top notch institutes, how important do you think it is to get good grades and admissions to top institutes in order to have a successful career? Are there any factors that one should keep in mind?

It is different for everyone, some have an inclination towards academics; some have towards co-curricular. The major factor is whatever you do just give in your 100%. If you're good in academics make sure that you do all the necessary groundwork that is needed and if you're in co-curricular make sure you give your best shot. If I consider myself, I've always been good in studies so I made sure to give in my best so that I could be at a position of benefit in front of others; on the other hand I also see my batch mates having not so great scores but having good co-curricular and all sitting side by side. At the end there would be no one to see your academics or your co-curricular, they would rather see what you've achieved till now, how your personality is, how you take up challenges and how wisely you manage them.

What opportunities do you see after pursuing BM in addition to your Bachelor's in Mathematics

After coming into MBA, I've learned a lot of things. I've got knowledge of plenty of domains, be it marketing, finance, operations or any other thing. I've believe I've got millions of opportunities and it depends on me what I wish to do. Even if 4-5 years down the lane I wish not to continue my job any further, I can also think of some start-up of my own, which might unfold in the upcoming years.

What are the goals and accomplishments that you are looking forward to achieve?

Presently if I talk of my short term goals, I would say I'd like to get into some good firm where I can learn different things, different areas of industry, how they function and how to make an impact in whatever domain you are in.

In my long term goal, I see myself at some top position of some top tier company wherein I can take my decisions on my own, contribute in a major way to it and align my values with it.

What other fields or activities interest you?Did you ever consider pursuing them professionally?

I've always had an inclination towards art and craft. I try devoting my extra time in art and craft or in reading books at times. But these have been my hobbies, art and craft being something where I can vent whenever I wish to, so, No, I haven't considered them taking up professionally, although one never knows about future, let's see!

What would be the one piece of advice that you would like to give to your juniors?

One thing that I'd like to say is that there would be number of challenges ahead of you, take them up. There would be times when there would be no road in front of you, try exploring new things, new paths. I know it's been a difficult time for everyone because of the pandemic but make millions of memories, do whatever you wish to, ask for help from your teachers, friends, seniors just anyone; explore your unexplored self because this is the time. But whatever you do, hang on to it and give your 100%

-Interviewed by : Vishtha Arora

Alumni

Garima Kumar - 2020, PGDM, XLRI, Jamshedpur

Himani- 2019, PO, Punjab National Bank

Vaishali Negi- 2019, M.Sc., IIT Indore

Jyoti Deshwal- 2019, M.Sc., IIT Jodhpur

Sadhavi Mehra- 2019, M.Sc., DTU

Priti-2020, Masters of Operational Reasearch, Hindu College, Delhi University

Madhurika- 2019, Actuarial Analyst at Mercer

Namrata Mongia- 2019, M.Sc., Miranda House, DU

Aanchal Agarwal- 2020, M.Sc., IIT Bhubaneshwar

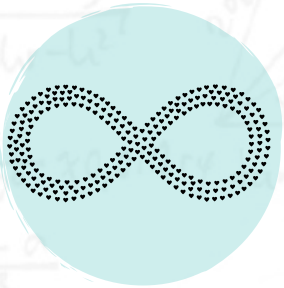
The Galleria Of Events

Despite all obstacles during the previous year, the Mathematics Department of Gargi College led by the Union 'Mathema' successfully hosted the following activities and events during the academic year 2020-21 in the digital mode.

WEBINAR ON INFINITY

25th September, 2020

The department of Mathematics of Gargi College hosted a webinar on the topic 'Infinity: a treasury of intrigue and interest' on September 25, 2020 over the Google Meet platform. The speaker of the day was Dr. Rita Malhotra, former Principal and Professor of Mathematics at Kamala Nehru College. She is also the President of Poetry Across Cultures, India. Patronized by our Principal, Dr. Promila Kumar, the webinar was attended by teachers and students from several institutions.



DEPARTMENT ORIENTATION FOR THE FRESHERS

10th November, 2020

During this online learning period, the first year students had their orientation via the digital mode itself. The session happened in the honored presence of the Principal Dr. Promila Kumar, Union teacher advisors and the department teachers. In the meeting students of first year were introduced to their course structure, class timings as well as department and college activities.

CAREER COUNSELING

15th February 2021

To make students Mathematics aware of the vast sea of opportunities after their undergraduate degree, career counseling was hosted by the department on February 15, 2021. The session was conducted for pre-final and final year students. The speakers of the day were Dr. Ravins, Assistant Professor at Jamia Milia Islamia and Mr. Ramakant Prasad, Associate Professor at Gargi College.

CHESS TOURNAMENT

10th February 2021

Mathema conducted an online chess competition to provide all chess enthusiasts a platform to brainstorm and showcase their skills in this game. The event took place on February 18, 2021 over a digital platform called lichess.org. Participants from various colleges took part in the nail-biting game of chess. While the participants showed zeal and enthusiasm competing with each other, the entire competition was monitored by strict rules. Vibhu Raj from Dr. Akhilesh Das Gupta Institute of Technology and Management emerged as the winner of the tournament.

ONLINE INTERACTIVE SESSION

with the First Year Students

24th February 2021

An informal virtual interaction session for first year students of the department was organized on February 24, 2021 by the third year students. During the session, the freshers talked about their experiences of online classes, college societies and various other experiences with their seniors. On the other hand, the third year students shared their experiences as well as cleared several doubts the freshers had in their minds.

ARTICLE WRITING COMPETITION

March

One of the most exciting events hosted by the department is the Article Writing Competition. This year, the topic for the competition was 'Relevance of Mathematics in other subjects'. Students from all departments and colleges participated. The winners were announced on March 4th via Mathema's Instagram account. First place was bagged by Rashika Pandit. While the second place was won by Shreya Agarwal and the third place was by Sarthak Pandey. Winners were awarded with certificates and cash prizes.

PAPER PRESENTATION

5th April 2021

One of the most exciting events conducted by the Maths department of Gargi College is the paper presentation competition. This year it was conducted via online mode on April 5. The topic for this year's presentation was 'Mathematics: A poetry of logical ideas'. Three esteemed mathematicians judged the competition,

Dr. Jyoti Darbari, Assistant Professor at Lady Shri Ram College for Women; Mr. Narendra Kumar, Professor of Mathematics at Gargi College and Dr. Vandna Luthra nee Arora, Associate Professor in Physics at Gargi College. The winners were awarded with digital certificate as well as cash prizes.

MACHINE LEARNING WORKSHOP

9th and 10th April 2021

A two day workshop for Machine Learning was hosted by the department on the dates, April 9 and 10. The speaker for the first day was Mr. Sanket Verma, chairperson at PYDATA. The attendees were elaborately explained Python and programming on the first day through detailed presentations. The speaker for the second day was Mr. Utkarsh Shukla, who further conducted a very informative presentation on data analysis. He is a Date Science Engineer at ATLAN. Participants of the workshop were awarded certificates after the workshop.

Token of thanks

Muskan Yadav
Prashansa Mewar
Nishtha Arora
Malavika MS
Meenakshi
Tareeshi Mittal
Niharika Sethi
Anushka Raghav
Nikita Singla
Raima