JUNE 2021 | ISSUE 2

CONVERGENCE

OFFICIAL E-NEWSLETTER OF DEPARTMENT OF MATHEMATICS, MAITREYI COLLEGE

HERD IMMUNITY

By Dr. Pakhi Gupta

On 31 December 2019, the WHO was informed of the 44 cases of pneumonia of an unknown etiology detected in Wuhan city, China, which were later confirmed as initial cases of Covid-19. Almost after a year and a half, there are over 176 million cases worldwide and over 3.8 million deaths. So what makes Covid-19 a pandemic?

Given any infectious disease, $\mathscr{R}0$ is the basic reproduction number of the disease, which means that the average number of people an infected person can infected. It varies from infection to infection; for seasonal flu, it is between 0 and 2.1, for measles, it is whooping 12 to 18 and for Covid-19 it is between 2 and 2.5. If $\mathscr{R}0=2$, it means a single infected person generates 2 new infections. So larger $\mathscr{R}0$ means the rapid spread of disease and when the basic disease reproduction number $\mathscr{R}0$ is less than 1, then infections end after some time.

Herd immunity is a key concept for controlling such pandemics. When the spread of a virus slows down (and standstill after some time) because enough people have developed immunity to it, at that point the population has developed herd immunity. This immunity can be developed in a population by a vaccine or by people naturally getting infected. So the key question is, how and when we will achieve this herd immunity?

A person who has recovered from the disease will have some immunity. This means after a while we are not dealing with totally susceptible population. Some other reasons for the reduction in the number of cases are the vaccines and non-pharmaceutical interventions such as social distancing, patient isolation, face masks, and hand hygiene. So, we look for an effective reproduction number of the disease sometimes, denoted by R, that is the average number of people an infected person goes to infect in a population that has some immune people.

If s is the proportion of the population that is susceptible to catching the disease then, we have $R = s\mathscr{R}0$. Herd immunity is achieved when one infected person in a population generates less than one secondary case on average, which means the effective reproduction number is below 1 in the absence of any interventions.

Since $R = s\mathscr{R}0$ for herd immunity $R<1$

$$s\mathscr{R}0 < 1$$

Or,

$$s < 1/\mathscr{R}0$$

Since s is the susceptible population, 1-s is the immune population. Thus

$$1- s > 1- 1/\mathscr{R}0$$

To achieve herd immunity we must be sure that at least $1- 1/\mathscr{R}0$ population is immune. In the case of the current scenario of Covid-19 for $s\mathscr{R}0 = 2.5$, we need to get at least proportion of

$$1-1/2.5 = .6$$

of the population immune, that means 60%.

To accomplish this herd immunity, countries across the world have launched some of their biggest mass vaccination programmes seeking to provide their citizens with protection from the virus as soon as possible. With limited resources and a huge population to vaccinate, a prioritized vaccination strategy was required. In India, the SEIR model has been adopted for vaccine allocation strategies. Initially, it was concluded regardless of efficacy, prioritized vaccination of >60 years olds leads to greater reductions in deaths than prioritizing vaccination of other age groups. But with the further harmful mutations of the virus, we ought to change our strategies from time to time.

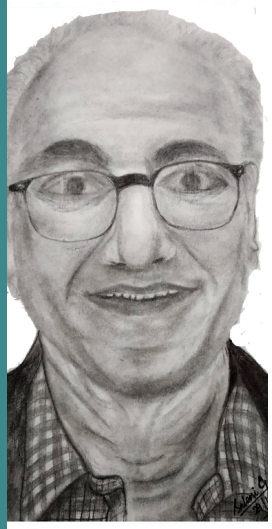
After the second wave and as now Delta-Plus mutant is knocking at the doors, it has become mandatory to vaccinate the whole population as soon as possible. Vaccination and the various non-pharmaceutical interventions will continue to have a large role in the course of this pandemic. Coronavirus is not going to disappear, but we can restrict its spread by establishing herd immunity, and eventually, enough people will be immune to give herd protection.

WHAT'S INSIDE THIS ISSUE

C.S. SESHADRI

LIFE, WORK AND HISTORY

By Saloni Garg and Manvi Chaudhary



Nothing in this world is an easy game, as it calls for an early commitment and complete surrender. This is proved by the world-class algebraic geometer, institution builder, and music lover Conjeevaram Srirangachari Seshadri, who was born on 29th February 1932 in Kanchipuram. One of the most innovative mathematicians of India with a blessing of hereditary excellence in music.

The "constant" Mathematician who turned 88 in February 2020, died on 17 July 2020.

He was the eldest among eleven siblings. His father was an advocate in Chengeleput. Seshadri's early schooling was at the St. Joseph's Elementary School and at Sri Ramakrishna School in Chengalpattu and final years of schooling at the St. Joseph's High School at Chengeleput. He graduated from Loyola College, Chennai in 1953 with a BA (Hons) degree in Mathematics. During his early years at college, he was encouraged by his teacher Prof S. Narayanan. Later, Fr. C. Racine played a decisive role in Seshadri's taking up mathematics as a profession. Seshadri's research career began in 1953 when he joined the Tata Institute of Fundamental Research, Mumbai, as a student. He received his Ph.D. degree in 1958 from the Bombay University for his thesis entitled "Generalised multiplicative meromorphic functions on a complex manifold". He completed his research under Prof K. Chandrasekharan who sculpted his mathematical career. Algebraic geometry was the field of his research which investigates the geometry of solution-sets of equations in modern mathematics.

Later on, he also developed The Narasimhan-Seshadri theorem. His introduction of standard Monomial Theory is widely recognized in addition to Geometric Variant Theory and Schubert Varieties. His work was added brick by brick in the Chennai Mathematical Institute and contributed towards framing India in the post-independence era. Seeking his achievements, he was referred to as an accomplished exponent of Carnatic Music.

In 1971, he was elected as a Fellow Of the Indian Academy Of Science. A well-known and recognized senior professor at TIFR, initially a research scholar, from 1953-1984 and then at IMSc in Chennai are some of his tremendous contributions towards discipline. He then established the active school of algebraic geometry in 1989, Seshadri became the director of the Chennai Mathematical Institute, later named the SPIC Mathematical Institute, founded by A.C. Muthiah.

Dr. Seshadri was a recipient of numerous distinctions. He received the third highest civilian honor in the country, Padma Bhushan in 2009. Recognized for the awards ranging from the Shanti Swarup Bhatnagar Award in India to fellowships with Royal Society fellowship and American Mathematical Society abroad, he proved himself to be an unconventional paradigm in each term. Not only he was a mathematician of international repute, but he was also a great musician, a great organizer, and an excellent human being of extraordinary potency. C.S. Seshadri was a man of letters who did marvelous work in mathematics especially in the field of algebraic geometry, which will be remembered for generations and beyond.

There is geometry in the humming of the strings, there is music in the spacing of the spheres.

– Pythagoras

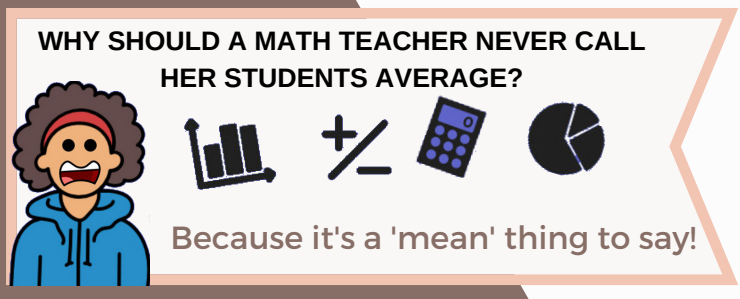
DEPARTMENTAL EVENTS

E-FAREWELL 2020

A rollercoaster of ecstatic emotions was set forth as the students and teachers bid a heartwarming farewell to the final year students (Batch of 2020) on May 16th, 2020. The principal, Dr. Hartima Chopra showered some words of wisdom to the students. The first edition of the annual departmental newsletter "Convergence" was unveiled, and the team was widely appreciated by all. The juniors showed their affection by presenting stunning dance performances and some melancholy songs. Moreover, the former principal - Dr. Swadesh Bhalla, addressed the gathering on the convolution of study and technology. The air was filled with nostalgia and gratitude as students shared some beloved memories, followed by an ardent poem, and a heartwarming goodbye from the seniors.

STUDENT DEVELOPMENT PROGRAMME

The Faculty of the Mathematics Department conducted a Student Development Programme, first of its kind, to engage the students in an effective learning experience on "Deep insight of MS Office and Google Applications". Topics like Excel, Google Apps, MS Word, and many other applications were talked through. The programme initiated on 22nd July 2020, 6 consecutive sessions took place extending to 27th July 2020. A total of 74 students from all three years of the department participated in the SDP. Overall it was a successful venture and immensely appreciated by the students for the good organization of the programme and the useful particulars provided through it.



E-TEACHERS' DAY

The Department Union organized an online Teachers' Day Event, with great zeal and enthusiasm on September 5th, 2020. The programme commenced with a cordial video, where all the students expressed their immense love and gratitude for the teachers. This was followed by a graceful dance and soulful music performances in the form of video clippings by senior year students. Furthermore, students displayed pictures of all the teachers and students reliving past memories, recited melodious poems, and appreciation speeches. The event was wrapped up by impassioned music performances by the teachers and interaction among faculty members reviving pleasant old memories. In spite of the challenges, the students used every bit of technology to make this virtual programme a huge success and would always be an unforgettable event for everyone.

WORKSHOP ON MENTAL HEALTH

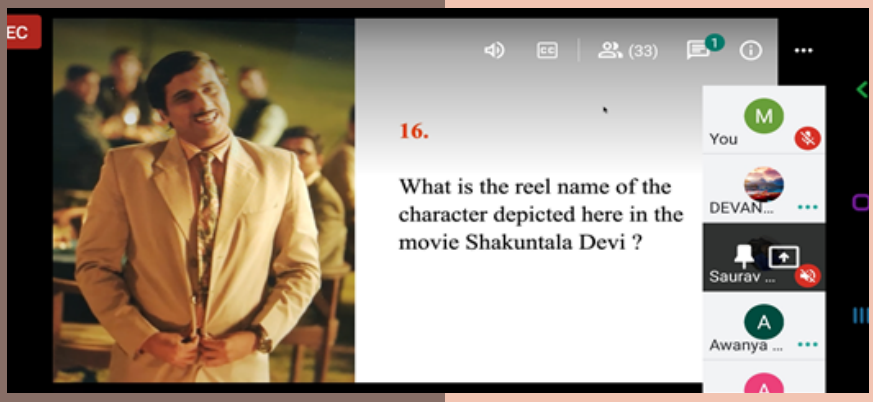
Given the current scenario of the pandemic and its adverse effects on people, an online workshop on 'Protecting Mental Health during Coronavirus Pandemic through Meditation' was conducted in collaboration with a non-profitable organization named Science of Spirituality. Ms. Seema Charla, the speaker of the session elucidated about humans, being a soul, and having a spiritual eye. She explained how to start Meditation, the role of Mantras and Simran, and the ethical lifestyle. Additionally, she also emphasized on the role of Meditation in living a healthy life in today's lifestyle where everyone is dealing with assorted troubles. The Session was joined by a total of 130 participants, including 20 faculty members and 110 students from various courses.

MOVIEMATHON

The screening of the movie Shakuntala Devi was televised followed by Moviemathon, an online quiz on October 28th, 2020 via Google Meet. All the attendees for the event later registered for the quiz. The quiz was based on the movie and constituted of two rounds. Cash prizes worth ₹2000 and ₹1000 were awarded to the winners. Overall it was a cheerful experience for all the students.

TALK ON ILT MODEL AND SOCIAL NETWORK

The Office Bearers and faculty members organized a virtual lecture on "ILT MODEL AND SOCIAL NETWORK" on October 27th, 2020 via Google Meet Platform by Dr. Deepa Sinha, a professor in Department of Mathematics at South Asian University, also a Graph theorist. She elucidated various topics related to graphs, nodes, and basic aspects of the Iterated Local Transitivity Model used in Social Media Networks. Demonstration of Mathematical and general Scientific applications in properties of Social networks, gathering data and statistics, engaged students to ask their queries, which were answered by Dr. Deepa Sinha in detail.



SUMMER PROJECTS

The Department of Mathematics worked on two summer projects covering the following topics:

MATHEMATICAL ANALYSIS ON COVID-19:

Four scholars from our college, under the guidance of Dr. Pawan Kumar worked on framing the model to analyse the outbreak of COVID-19 in Delhi. The objective of the model was to predict the increase in the number of infected population, showing its exponential growth and detailing through the various graph of all possible models.

PANDEMIC SCARE IN THE NATIONAL CAPITAL OF INDIA:

Three students, under the guidance of Dr. Archana Paradkar and Dr. Neetu Arneja undertook a project to cover pandemic models using mathematical tools on the Coronavirus in Delhi. The objective of the project to analyse and formulate equations that provided information to understand the relations between various key parameters of the pandemic.

NATIONAL WEBINAR

The Department of Mathematics organized a National Webinar on 'Role of Mathematics in secure communication' on November 27th, 2020 via Google Meet Platform, which observed an audience of around 100 students. The Speaker of the Webinar, Dr. Dhananjoy Dey is an Associate Professor from the IIIT, Lucknow. Honorable Principal, Dr. Haritma Chopra, started the event by enlightening the students with her words. Post this, Dr. Dhananjoy Dey started his presentation explaining all the communication processes including encoding, modulation, compression, error control, images, etc. Furthermore, he also gave a generic view of Secret Key Cryptography. He talked about Cryptography and its various fields. The talk session ended with a question and answer session. The webinar helped the students to learn about the security of online platforms which are currently being used globally for conducting online classes and the mathematics behind it. It helped the students to become more aware of the intricacies involved in securing modern modes of communication.

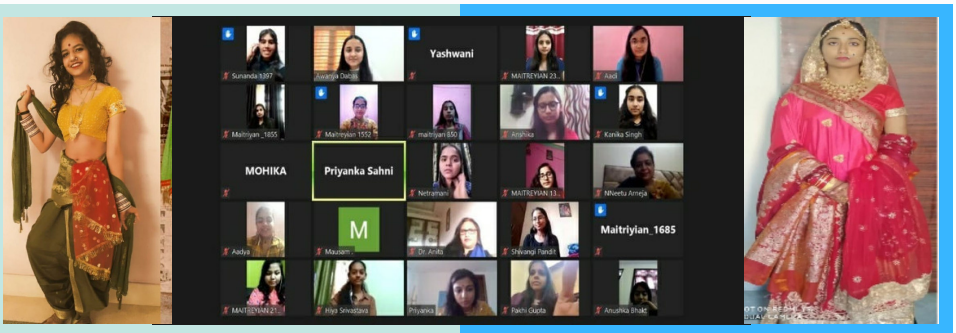
Result:

S.No.	Name	Course	Semester	College
1	Sakshi Jain	B.Sc. (H) Mathematics	6	Maitreyi College
2	Partik Kumar	B.Sc. (H) Physics	6	Rajdhani College
3	Abhishek Kumar	B.Sc. (H) Mathematics	6	P.G.D.A.V. College

AVGAAHAN

Under the aegis of Avgaahan 2021, the annual interdisciplinary festival of Maitreyi College, Mathology 2021 was organised by the Department of Mathematics. It was an online event and had two rounds. The first round named, "Math-e-logic" (conducted from 4-02-2021 to 6-02-2021) was a quiz based on mathematical aptitude. And, the second round, "Puzzle Mania" (conducted from 15-02-2021 to 17-02-2021) required the participants to make a mathematical crossword puzzle. A total of 550 registrations were made, out of which 234 participated, and the top three bagged the winner price. An interdisciplinary e-conference was initiated this year under the aegis of Avgaahan on 24-02-2021. Students and teachers from the Mathematics Department participated in the same under the guidance of faculty members.

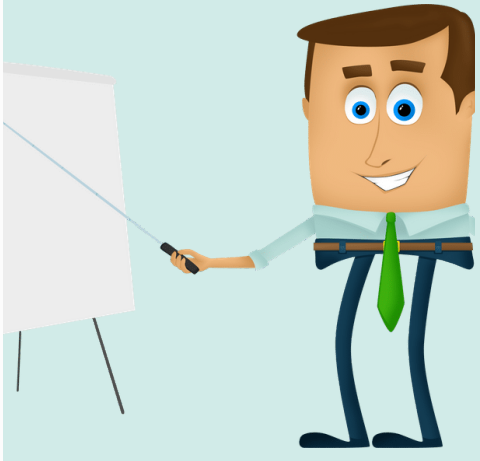
FRESHERS' PARTY 2021



The Mathematics Department of Maitreyi College organised a virtual Freshers' day party for the new batch of 2020 on 10th February 2021 via Zoom Meeting Platform. As a tradition to invoke the almighty at the beginning of an important event, the program started with Ganesh Vandana. Subsequently, the event began with the facilitators welcoming all the attendees on behalf of the entire Mathematics Department. Following the "boho theme", all the Freshers dressed accordingly. Moreover, a Miss Freshers' Contest was orchestrated and was judged by Dr. Neetu Arneja from the Mathematics Department & Dr. Anita Devi from Hindi Department, and Prachi Matta won the contest. All the faculty members present said a few words for the new students and congratulated the title-bearers of the event. For interactive entertainment, a game was coordinated by all the freshers. The E-party was concluded with a Thank-you note and it was a memorable event for the department.

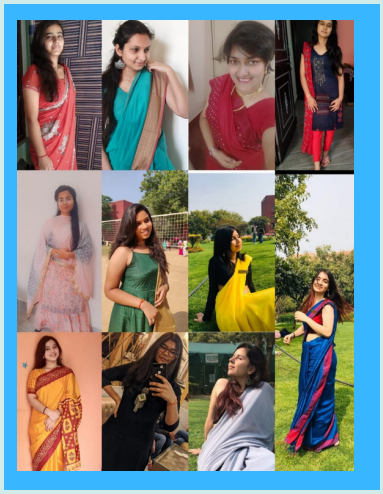
INTERNATIONAL WEBINAR

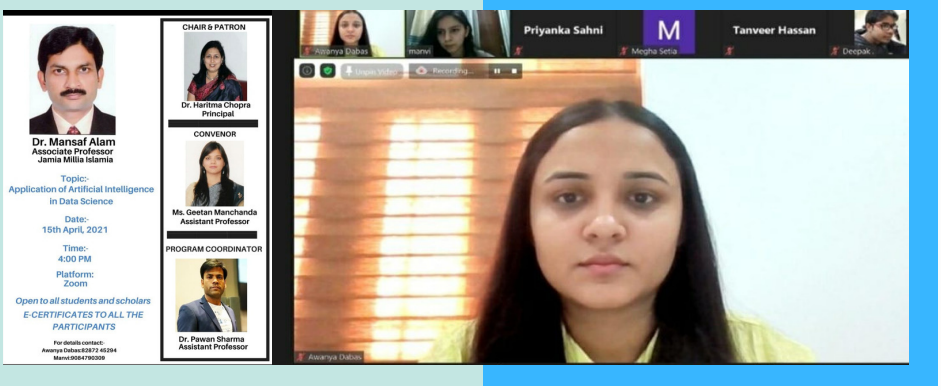
The Mathematics Department organised an International webinar on "Fixed Point Theory and its applications" by Dr. Guran Manciu Liliana who is an Assistant Professor at the Western University of Arad Romania. Dr. Guran is a Mathematics and Physics Lecturer at various institutions and has a Ph.D. degree in Mathematics from Babes- Bolyai University. The webinar was held on February 5, 2021, via Google Meet Platform, with about 85 attendees in participation, including students and faculty members. Dr. Haritma Chopra, Principal of Maitreyi College, welcomed the guest and discussed her affinity for mathematics. The speaker explained the topic of "Fixed Point Theory and its Applications," which helped the participants grasp its meaning, she also introduced the fixed point theorem for a general contractive condition in complex-valued metric spaces. Overall it was a very insightful session for the attendees.



E-FAREWELL 2021

The Department of Mathematics organised the Farewell Ceremony for the Batch of 2021, Adieu'21 on 29th April 2021, via Zoom Meeting Platform. The event began by embracing all the guests and greeting final year students through a welcome video. Maintaining the legacy of farewell at Maitreyi College, the entire batch of 2021 were uniquely entitled. A memorable goodbye video was shared to thank the graduating seniors for their solace and affection. Moreover, a movie clip was shown to commemorate the beautiful journey of the passing out students that made them very emotional. With this, the heart-touching part of the event arrived when teachers and students shared their feelings. The event was full of love and warmth and depicted that these three years were full of cherishable memories for both students and teachers.



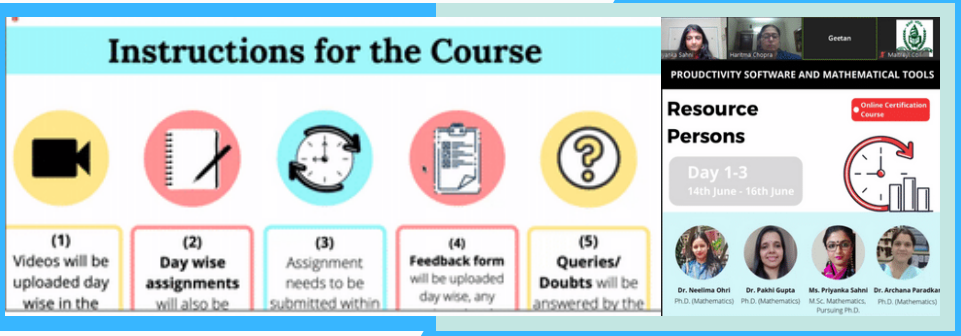


WEBINAR ON "APPLICATION OF ARTIFICIAL INTELLIGENCE IN DATA SCIENCE"

The Department of Mathematics organised an informative webinar on "The Application of Artificial Intelligence in Data Science" by Dr. Mansaf Alam on 15th April 2021 via the Zoom Meeting Platform. Dr. Mansaf Alam is an Associate Professor of the Computer Science Department in Jamia Milia Islamia, Delhi. He has been teaching in the Department of Computer Science for the past 18 years. In the session, he started briefing on the topic and elucidated its various aspects like the pros and cons, the academic requirements, the futuristic importance of Artificial Intelligence, etc. Furthermore, a short Q&A session was held to clarify the queries of the students for their better understanding. The event was concluded with a Vote of Thanks.

CERTIFICATE COURSE

The Department of Mathematics organised a National-Level Online Certification Course on "PRODUCTIVITY SOFTWARE AND MATHEMATICAL TOOLS". The span of the course was from 14th June 2021- 24th June 2021. Students belonging to various programmes from all the years and colleges across India attended the classes. The course was taught by the faculty members of the Maths Department of Maitreyi College. The tutoring was done through online interaction via video lectures to avoid the hindrance caused due to network issues. Certificates were issued to the registered candidates on completion of the curriculum. The course helped many students in learning beyond their academic syllabus. It educated the attendees regarding various apps and softwares that are required for mathematics and related programs in the corporate world .



MATH AND ANXIETY

WRITTEN BY ANUKRITI BISHT AND MANVI CHAUDHARY

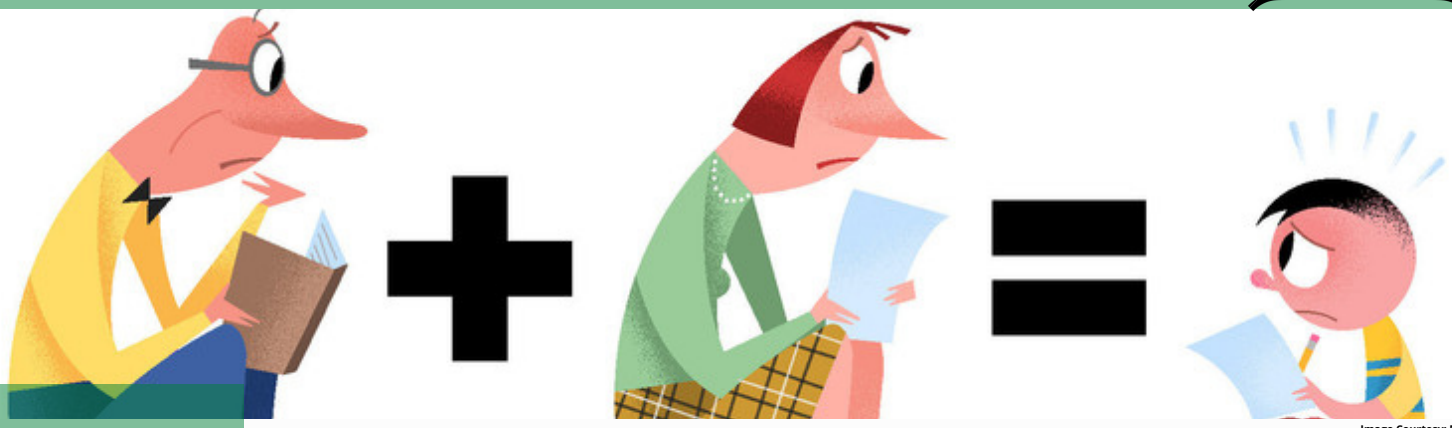


Image Courtesy: Facebook

> *"The higher one's math anxiety, the lower will be one's math learning, mastery, and motivation"*

WHAT IS MATH ANXIETY?

Math anxiety refers to the panic, helplessness, paralysis, and mental disorganization that arises among some people when they are required to solve a mathematical problem. Research suggests that mathematics anxiety can affect individuals in varying ways, inducing cognitive, affective, or physical reactions. For example, a cognitive reaction may involve negative self-talk, blanking out, and avoidance, an affective reaction may be characterized by a distrust of ability, fear of looking foolish, and loss of self-esteem, while a physical reaction may be evidenced by excessive perspiring, a boost in one's heart rate or nausea.

WHAT CAUSES MATH ANXIETY?

The pressure caused by time limits on tests: The deadlines imposed on students by timed tests lead them to feel anxious which further leads them to forget concepts that they have no problem remembering in more comfortable situations. Since these tests usually have the ability to cause a negative impact on grades, the student's fear of failure is confirmed. This creates a vicious circle that can be difficult to break.

The fear of public embarrassment: Math anxiety has also been linked to negative emotions from the past. If a student is being berated in front of their peers for getting an answer wrong, it can make their anxiety worse.

Influence of educators: A teacher's approach to the subject can also have a major impact on a student's perception of the same. If a teacher is positive about math, students' attitudes towards it might also change. But if educators' approach is negative, it can have an opposite effect.

HOW TO PREVENT OR REDUCE MATH ANXIETY?

Mathematics makes a lot of people distressed while many of them completely resort to disliking everything related to the subject. Even mathematicians are sometimes unsure of themselves and get that sinking, panicky feeling called "math anxiety" when they first confront a new problem. If you have math anxiety, the following ideas could help you eradicate it:

ACCEPTING AND ASKING QUESTIONS

The first step is to accept it because the first step to get through almost every problematic situation is accepting and validating it as it is. The second important thing to do is to ask questions. Never be afraid to ask for someone's help. Try to eradicate the fear of embarrassment related to asking questions, taking someone's guidance will help you perform better.

ENCOURAGE AND APPRECIATE

Since we know that people with math anxiety face challenges in their math classes, careers, and everyday lives, it will be helpful to offer them support and assistance rather than mocking or ridiculing them for their struggles. While researches are still being conducted on this subject, it is important to have conversations about your emotional and physical responses to math because this is the first step towards helping to reduce the potentially harmful effects of math anxiety.

PATIENCE AND PRACTICE: THE KEYS

While the next step is to find ways to tackle that situation so as to achieve the best possible results. If you face constant troubles doing math, start practicing a few basic problems each day. When you believe you're clear with your basics, slowly move on to more complex questions.

DO NOT GIVE UP!

Do math in a way that's natural for you. There's often more than one way to work on a math problem. DO NOT GIVE UP. Accept and analyze your mistakes carefully. Work to understand it in your own way rather than just trying to mug up someone else's method. It could help you learn faster and with clearer concepts. Always be confident in your approach. Remember, each mind has its own method.

THE MIND LAB 2.0

By Ayushi, Anukriti & Priyanshi

Agent Green, you have the ultimate responsibility to decrypt the ciphered texts based on your abilities.

1. AIAIVISREFVIEO
Hint: 1+4*3-18/3+(8/4)-5=?

2. XTRJ NSKNSNYNJX FWJ GNLLJW YMFS TYMJW NSKNSNYNJX
Key: May

EASY

3. EONIWXGMTCINXRSI
Key: Cool season is here

4. EYNSNTEHXCEDRIIOCVTGXNE
Hint: I have a tail and head but no body.
Guess your key.

5. NEETTYIOTLMWAYURLDSRWLHOUEE
Hint: Solve for a real non-zero value of the equation
(Key)^3 - 3(Key)^2+ 9(Key)+ 3= 30

MEDIUM

6. DSOEGNLETGTLGYEUOTMUNTEDWHO
Hint: Apply R_180 on 6

7. AAENSSWNIIHTTCNAHYOOPTSSSGEIIEAWD
Hint: solve phi(6)+phi(5)+phi(2) , where phi(n) is Euler function

8. CBDNOMEEIOIMURSNRCPNSUETSLXAELCERE
Hint: key is the number of elements in Dihedral group D3

9.TIAUVWOSLFLVMJVOETFQBUGNVFJIMLGZESG
Key:ABSCISSA.

10.VRYXBKRUIIGEETKMJRZGOVWNYEKXYEOQRYWRK ZMFXITIDZRJFPXCIVTXVRYIQAWVV
Key: REVENGE

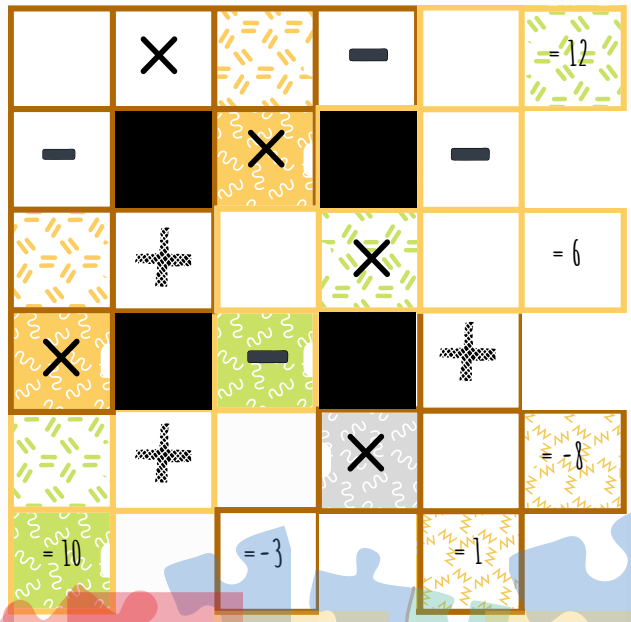
DIFFICULT

11.PKELMWMLELAWYKQKFLUPQGGLFXVSALIOBLQSD WGLCWBEFGCW
Key: ATTACK

12.UKGEABLRFOEGRMGFMVQUGAUKREPIKOHMPVGF WGFRLHGVBHDWQUVOIRUALAODYQCV
Key: SACK HER

ONLY THE FOLLOWING INTEGERS ARE TO BE ARRANGED!

6 -1 4 6 2 3 6 1 -2



PHASE I

Agent Green, you are bestowed with a solemn responsibility of cracking The Mind Lab 2.0. Agent Perry, your colleague, has successfully found all necessary clues to decrypt the following texts and you need to unriddle without violating the given protocols!

Instructions to decrypt:

- Twelve sentences have been encrypted using classical algorithms of encryption.
- According to Agent Perry, only five particular methods of encryption are used and these are: Shift, Columnar transposition, Railfence, Vigenère and Playfair Encryption algorithms.
- These twelve sentences are classified as EASY, MEDIUM and DIFFICULT to decrypt (four sentences in each category)
- Agent Perry has also managed to find hints corresponding to the MEDIUM and EASY sections for which keys were missing.

PHASE II

Agent Green, Phase II of The Mind Lab 2.0 has following conditions to meet:

- A grid has fixed binary operations and integers.
- Only one integer, out of the given, to be written in one cell.
- Only the given integers are to be arranged in the cell without repetition.
- No more binary operations can be added.
- The resultant equation must equate to integers at the end of alternate rows and columns.
- Elementary mathematics to be used (BODMAS).

Keys used in phase 1 :
1) 4 2) May 4) COIN 5) 3
6) 9 7) 7 8) 6

Share your answers at gradient.newsletter@gmail.com

ALUMNI TALKS

MY JOURNEY IN MAITREYI AND GRADIENT

Written by
Aparna Bisht
2019 Batch

I remember the day I first stepped in Maitreyi, a confused girl, her first time in Delhi, mesmerized by the people around her, searching for classes, and I also remember my last day, the composed, 'social' girl with a 'Ms. Gradient' title. Sums up my journey!

I could have never thought that a college, an educational institution would have so much to give. Maitreyi is perfection, the environment, the people, and yes the garden! And what was better than being admitted to Maitreyi? It was a big joint family, with four generations, the eldest being our savior, our guide, and our seniors constantly preaching to us to break some rules, have some fun, and also not neglect the syllabus. The first years, the innocents, and the second years were like cheese slices in a sandwich (you know how it adds to the taste) And I loved how everyone was always so helpful and considerate, classmates, seniors, and our teachers. I love how our meetings were always about how we should be doing some activity and we did those, we watched movies, attended talks, went outing, had quizzes, had notice board decorations. The best part is, it was all our professors' ideas, they wanted us to engage more in activities, not just in our college but outside too. And yes, the highlight of being in the Union was the Annual Departmental Fest. As we continued planning for more events, I found myself growing, sort of like coming out of my shell. I remember how, when I told people that I'm graduating with a Maths major, they would just bat their eyes in amazement and talk about their fear of maths. I also remember a professor from Texas University telling me 'A woman who can do Maths, can do anything', so yes a big appreciation for all my Maths majored women!

CHALLENGES, OPPORTUNITIES & BEAUTY

Written by
Shreya Verma
2019 Batch

For me, the most important turning point of my life has been my journey at Maitreyi. For me, it is not just a college, but the place that helped me discover myself. For a person whose parents wished her to become a Doctor, but instead got herself enrolled in Mathematics, I was extremely shy and anxious. I was already joining a month late, so I was prepared to experience exclusion from my classmates. But, I could not be more grateful for the people I met, because the friends I made then have been with me ever since. All the teachers in my department are so friendly, understanding, cooperative, and sweet. They guided me throughout my career and supported me like a true friend. Reminiscing these little things makes my heart go-

Na kisi manzil ki fikar thi,
zindagi jeene ki umar thi,
dosti aur doston se udhaar ke din the,
woh din bhi kya din the ♥

Throughout three years, I participated and led various events. Trenchant, our college debating society was another beautiful leadership experience. When I look back, I see the difference in myself. After graduating from Maitreyi, I had bittersweet feelings. I was excited about my next phase of life at Columbia University, but I felt like I'm leaving my family behind. It's been two years now, but I miss those days as fondly as I did after passing out. Words can never suffice how much gratitude I have for my college, my friends, my teachers. I feel proud to take the leap by choosing Mathematics and joining Maitreyi. I am grateful for the challenges, opportunities, and beauty I have had in my journey at Maitreyi.

Maitreyi College is a place where I turned up into a completely different personality. I learnt how to do tasks much more efficiently. Also, the teachers of my department (mathematics) were so cooperative and friendly. They not only encouraged me to be studious but also to learn other skills too. In my final year of graduation, for the first time, the mathematics department took an initiative to provide free of cost extra classes to students for IIT-JAM preparation, which really worked well for me and helped me in getting admission in IIT-G. Apart from that, the study material was also provided free of cost. Students from other colleges were also allowed to attend these extra classes. Professors here, make so much effort in building up students' skills. Some memories are unforgettable and for me, this three-year journey in Maitreyi is the same.

UNFORGETTABLE MEMORIES

Written by
Vanshika Pahwa
2020 Batch

TEACHERS' COLUMN

BITCOIN

Dr. Khushboo Bussi

We can say this, money comes in all forms
No more now, it follows any norms.

From poor to rich, white to black
It is computer generated, not just from the bank.

Bitcoin has its own price, that is more than wheat, barley and rice
And its safety becomes bread and butter for many wise.

The more it becomes digital, the less is the hurdle
needs to deal with more sophistication otherwise curdled.

No looting, no robbery, no physical violation of money can take place
what is troublesome, just a mere machine with some great pace.

I'd rather hope, a new one world with a new one currency
at least this could bring us as one unit in an emergency.

This is the time to say that 'We are One'
against everything that divides and makes us none.

A SWEET ENDING TO A NEW BEGINNING

Ms. Elizabeth Michael, on her retirement

"Retirement is mostly seen as a departure from occupational lifestyle to that of depending on pension.

Teaching was a wholesome experience for me; I have many fond memories of my teaching life spanning over four decades, about students, teachers, and other staff with whom I had interacted profusely and experienced their love and warmth.

I loved teaching, watching the students growing in their studies, and generally being an active teacher of the college. It was a bit upsetting, as I got closer to retirement age because I indeed loved my job, my friends, colleagues, and the academic, social and cultural eco-system that prevailed in the college. Teaching was a passion for me; that might have been the reason even if I was not well, I would go to college and give lectures and forget about my un-wellness.

Being with young enthusiastic students always rejuvenated me, making me forget the fact that I am ageing. I never felt that I was ageing till the last day of my retirement. I really miss the college, miss seeing the lovely students and above all my friends and colleagues. When I look back, I feel I had a rewarding teaching career being part of a great institution.

Thankfully due to the advancements in technology, I am still able to see colleagues and former students occasionally.

When I was preparing for retirement I was thinking of certain things which I would be doing post-retirement like more involvement in community services. My family has helped me become a bit more comfortable with my retirement."

POETRY FRAGMENT

Image Courtesy: Dr. Khushboo Bussi

MATH AND MUSIC

BY AWANYA DABAS

To you, They may be different,
To me, They are the same.
The beauty of Math in Music,
Should you acclaim.

The beating of the heart,
The pattern of the breath,
Do all indicate,
Math & Music are one & the same.

Math & Melody, run along
A parallel path.
If numbers don't exist,
Music is affected by the aftermath.

Numbers do measure,
The rhythmic time.
From notes to beats,
Numbers make the bells chime.

All in All,
We do say,
Maths and Music,
Get along two-way

THINK 'N' GRIN

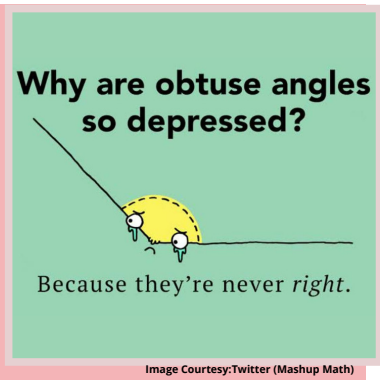


Image Courtesy:Twitter (Mashup Math)

WARRIOR'S WONDER

BY AYUSHI RAWAT

Moments you sit cross with fate,
when it plays hard on again,
whence it stares you
dead a grave.
Just right then, right there,
sit for a moment, shushh,
not to utter a word!

A feeling so miserably ill
will stop you on the way forth.
And you, my warrior,
will slay down the world
with a mere sword.

But this very moment,
listen to this sky.
How it screams them deaf,
thundering their throats dry.

How it turns purple,
when you wish
for your blues
a little less struggle.

And when you moisture
to the thought of them trampling,
think of the oblivion above.
How often it's punctured
by the sun,
yet covers the infinity beyond.

THE ADMIRABLE NUMBER: PI

BY TANNU SEHRAWAT

Three-point one four one.
All the following digitals are also initial,
Five nine two because it never ends.
It can't be comprehended six five three five at a glance,
Eight nine by calculation, seven nine or imagination.
Not even three two three eight by wit, that is, by comparison,
Four six to anything else,
Two six four three in the world.
The longest snake on earth calls it quits at about forty feet.

Image Courtesy: Torsha Dwivedi

MATHS: A SOLVED MYSTERY

BY AADYA KHULLAR

Solve for x !
And begin the quest ;
'y' comes to help,
as an initial condition to find x.
But the curiosity rises
Why is 'x' always in crisis?
Maths felt the need to explain
That it's not always x who's in pain ;
It could be alpha gamma beta
at times even sine cos or tan theta.
Then the detective understood to some extent,
Still couldn't find himself content ;
He got lost in this cryptic mystery,
And started to feel variables' misery.
Although he didn't give up so soon
Rather tried to presume ;
An 'if-and-then' condition
In an attempt to begin the question.
He kept trying to solve the puzzle
Irrespective of his frustrating struggle
And after going through many failures
He got a hold of the riddle's behaviour.
A boost was found to try once more
And finally felt like he won the war.
Then the intellect of maths was recognised
While the key to solve the mystery was realised ;
The detective learnt a lesson from this case
That maths problems are just a phase
Which can be solved with hard work and determination
Once you understand the given situation.
Then problems themselves start to indicate the solution
That comes into notice only after thorough observation ;
Concluding that it maybe us who solve these complexities
However, maths in itself is a solved mystery

MATHS STUDENTS

BY DEEPIKA

People call me a difficult subject,
but I ain't tough, last I checked.
I am more like a puzzle
that can be solved without much trouble.
Students run away from me,
Instead of looking into me.
People will embrace me,
if the logic within, they can see.
I am the "Subject of the Universe"
from zero to infinity, my ways are numerous.
You may love me or struggle to be with me
But you can NEVER replace me.
But when you rightly approach me,
you will find a way to love me.

MATHS & LOVE

BY ANSHIKA SINGH

Maths and love both are same,
As both affect the heart and brain.
In the beginning, it all seems so simple and silly,
But when we go further, it burns like a chilli.

As time passes by, both become complex,
And share the common letter 'X'.
But when the problem turns out to be tricky,
It usually leaves us too dizzy.

We can leave it and move on to make amends,
Because after all, it's all human nature my friend.
Moving on doesn't solve the issue,
Rather it'll wet your tissue

Solving a problem is equivalent to a staircase,
In order to reach fast, we chase,
Sometimes missing steps we might fall,
Can be a big mistake, can be small.

We have to return to the same spot,
To find the root cause.
Soon you'll realise that it wasn't a big deal,
All it required was patience and time to sink in.

Finally, the only uncommon thing between them is,
One of them is still running after their 'X'.

PICTURE PERFECT!

FEATURED ITEMS

BY DR. KHUSHBOO BUSSI

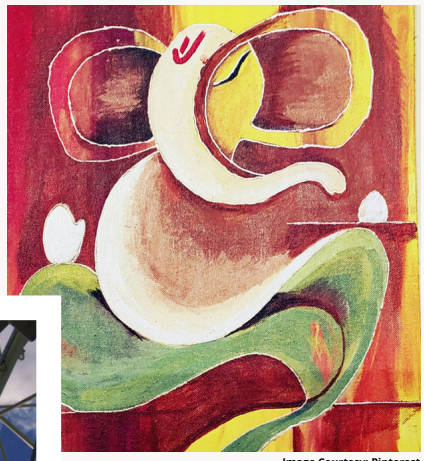


Image Courtesy: Pinterest

BY SHREYA PURWAR

Image Courtesy: Facebook

BY NEHA NAUTIYAL

BY DR. KHUSHBOO BUSSI

BY TORSHA DWIVEDI

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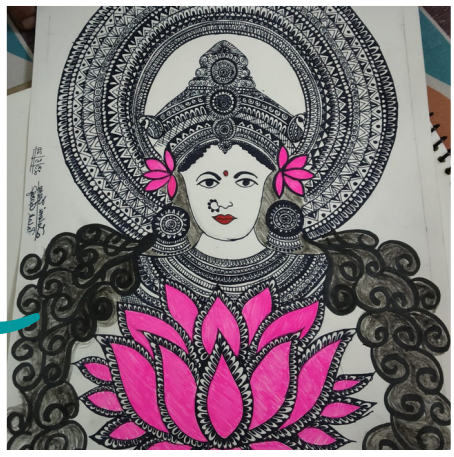
BY MUSKAN RAINA

BY TORSHA DWIVEDI

BY MS. PRIYANKA SAHNI

BY SALONI GARG



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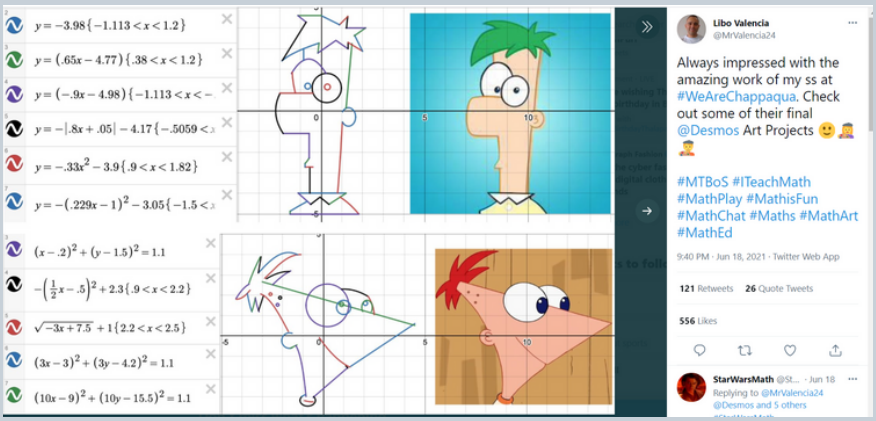
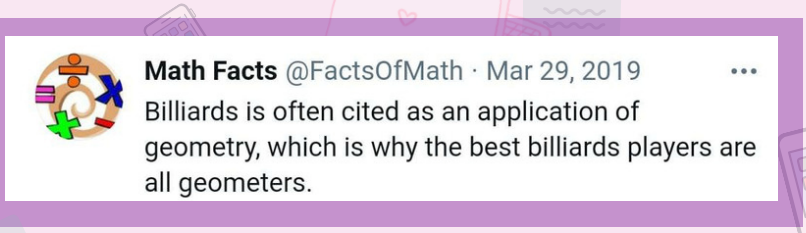
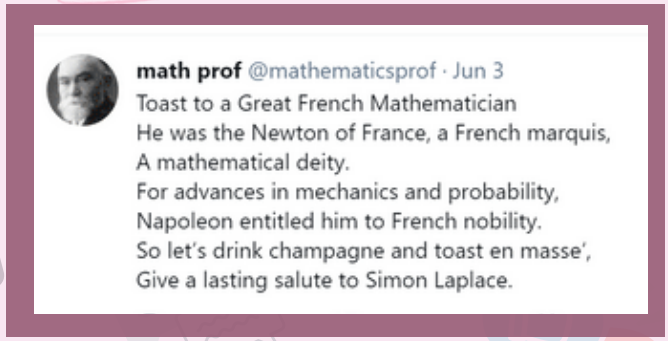
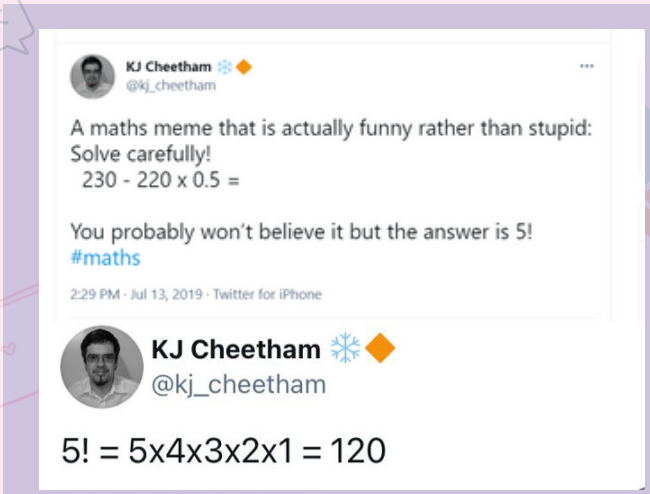
Messages Contacts

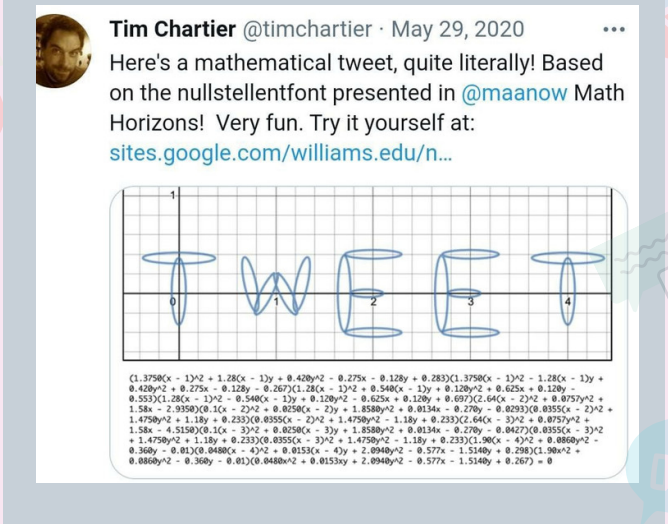
MATH IN MEDIA

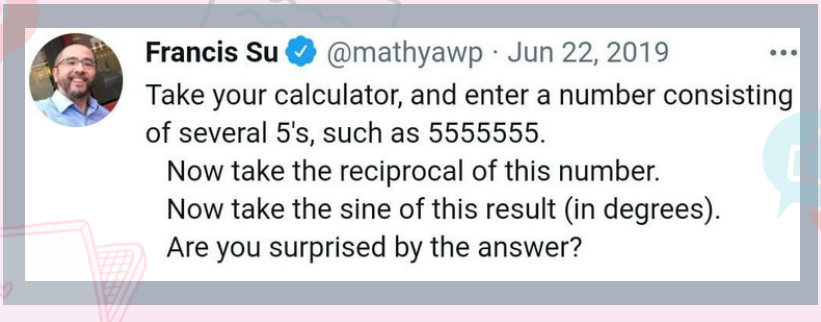












Send

MOVIE REVIEW

REVIEW OF "HIDDEN FIGURES" BY ANSHIKA SINGH

This great piece of art is directed by the exceptional Theodore Melfi which is also an adaptation of the book entitled the same by Margot Lee Shetterly . This is a true story that revolves around three African-American mathematicians namely Dorothy Vaughan , Katherine Johnson and Mary Jackson played by Octavia Spencer , Taraji P. Henson and Janelle Monáe. The plot of the story will leave you awestruck as you will be inspired and impressed by the struggle of these astounding black women who had to fight both racism and sexism at NASA by proving that they were the real heroes behind the successful launch and orbital space journey of astronaut John Glenn back in the 1960s .

Katherine Johnson worked at the Langley Research Center in Hampton, Virginia in 1961, alongside her colleagues Mary Jackson and Dorothy Vaughan. White supervisor Vivian Mitchell assigns Katherine to assist Al Harrison's Space Task Group, given her skills in analytic geometry. She becomes the first Black woman on the team;here head engineer Paul Stafford portrays the cartoonish villain by being dismissive.

Image Courtesy: Wikipedia


Image Courtesy: Moon Math


Image Courtesy: Lewes Film Club


Image Courtesy: Collider.com

The Oscar nominated movie gives a huge shout-out to Euler's method, a centuries old math technique which in layman's lingo allows us to approximate a differential equation numerically without actually ever really solving it .

Mary is assigned to the space capsule heat shield team, where she immediately identifies a design flaw. Encouraged by her team leader Karl Zielinski, Mary applies for an official NASA engineer position though she is told by Mitchell that, regardless of her degrees, the position requires additional courses.

Mary files a petition for permission to attend all-white Hampton High School, despite her husband's opposition. Pleading her case in court, she wins over the local judge by appealing to his sense of history, allowing her to attend night classes. The absurdity of segregated bathrooms made Katherine ran across the campus just to find a colored women's toilet which cost her 40 minutes . She was confronted by Harrison about her "breaks," unaware that she is forced to walk a half-mile to use the nearest colored people's bathroom.

She furiously explained the discrimination she faced, which leads Harrison to knock down the "Colored Bathroom" sign and abolish bathroom segregation. Katherine meets African-American National Guard Lt. Col. Jim Johnson, who voices skepticism about women's mathematical abilities.

When a librarian scolds Dorothy for visiting the whites-only section, she steals a book about Fortran and teaches herself and her West Area co-workers programming because after all "Knowledge has no color". She visits the computer room, where she successfully starts the machine, and is promoted to supervise the Programming Department; she agrees to do so if thirty of her co-workers were transferred as well.

The cinematography will also take you to the personal sufferings of the lead women and how they fought their own battles by working in a "man's world" .

With the amazing angry speech by Taraji P. Henson and mic drop moments, **"Hidden figures"** portrays that whenever the word mathematician is used we shouldn't only imagine a male (especially a white one) in our head; if she can make a coffee who knows she is the one behind the calculations to make the coffee-maker.

In conclusion, this "shero" movie is a must-watch as it'll keep the adrenaline pumping with its canny feminine energy throughout the movie.

MR. ANGLE WRITES TO MISS IMAGE

By Anshika Tiwari

House no. X, Y, Z
Plot No. 64
Rectangular Street
Circular Avenue
Geometry City

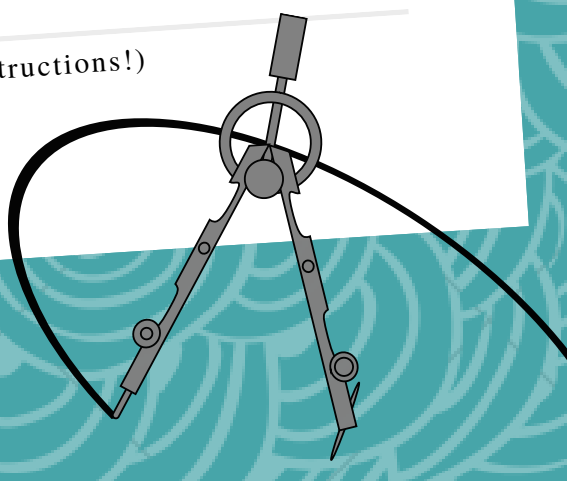
My Dear Image,

Yesterday when I was strolling in Pentagon Park, I saw you in the circle of your friends. Both my eyes were centered on you making an angle of 45^0 and you were sometimes diagonally or vertically opposite to my angular view, I tried to meet you but it was like trying to match parallel lines.

The thin arc of your eyebrow and the gentle curve of your nose with your cylindrical elbows resting on the rectangular table at 90^0, divided my attention into two halves. Your company could cause either an elevation or depression in my altitude. Please consider my construction.

Yours Mathematically,
Acute Angle

(Please try to help Miss Image to complete the constructions!)



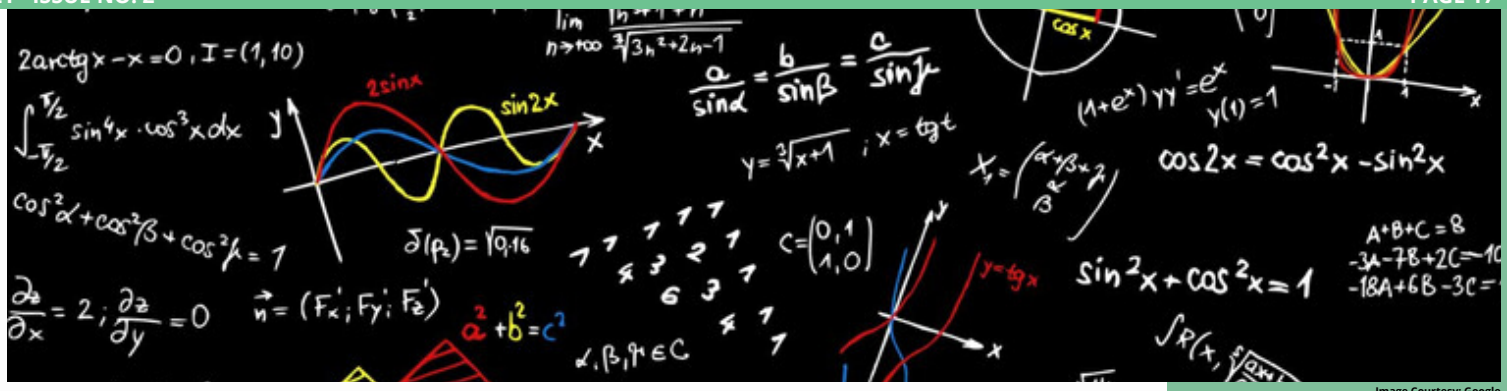


Image Courtesy: Google

MATHEMATICAL APPLICATIONS IN BIOLOGY

By Gargi Kansal and Yashika Mediratta

A world beyond our imagination, with unlimited applications, potentialities, and extreme cognizance, that's the world of Mathematics. Commencing from the basic formulas to complex equations, the applications of Mathematics are unlimited. There are significant areas that need certain attention to the subject, including Biology and Medical Sciences. Mathematicians and biologists have a long history of successfully working together in utilizing concepts like real and complex analysis, integral and differential systems, algebra, geometry, number theory, statistics, etc. From theoretical models being used to describe the spread of diseases discussed by Bernouilli and the flow of blood in veins by Euler, to applications of Topology and singularity theorems being used to investigate underlying biological processes by Rene Thom, Mathematics results have led to a significant development in Biology.

CREATING MODELS

One key role of math in biology is the creation of mathematical models. These are equations or formulas that can predict or describe natural occurrences, such as organism behavioral patterns or population changes over time. One such example is, in the research of the Covid 19 vaccine during the outbreak of novel Coronavirus, mathematical models were created to study the effectiveness of the medicine against the viruses.

STATISTICS

A sub-field of biological science is the field of biostatistics, a field in which statistics are used to describe and explain the life sciences.

Biostatistics is the application of statistics to a wide range of topics in biology. The science of biostatistics encompasses the design of biological experiments, especially in medicine, pharmacy, agriculture, and fishery; the collection, summarization, and analysis of data from those experiments; and the interpretation of, and inference from, the results.

WHY STATISTICS ?

Descriptive statistics does not help us to reach the standard conclusions but since this involves the data through practical applications so these figures work with the preliminary data to define problems and indicate areas requiring further research.

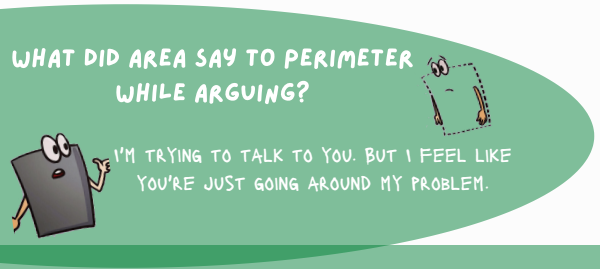
For example, descriptive statistics in a health care setting is most likely to entail measuring central tendency: finding the mean, median, and mode.

- **What is the mean age of patients seeking birth control?**
- **What is the median patient census by the day of the week, grouped by month?**
- **What is the mode age of children contracting measles?**

It mainly consists of various steps like the generation of hypotheses, collection of data, and application of statistical analysis.

Hence, it's considered that Mathematics will be the future frontier of Biology and Biology will be the future frontier of Mathematics.

"All science as it grows towards perfection becomes mathematical in its ideas."



EMBARKING ON A NEW JOURNEY

AGAINST ALL ODDS!

-Manvi Jain
Faculty of Management Studies, DU'23

During the days of my third semester, I was in a dilemma about what to pursue after my graduation and after a rigorous amount of research and self-realization, I made my mind to pursue an MBA. So basically I started my coaching in my 4th semester, but it took no time for this pandemic to shift us towards the culture of online classes. Amidst everything wrong going on around us, this turned out to be a boon for me. Initially, it wasn't easy to adjust but eventually, I got a hold of the system and realised this helped me a lot as I got enough time to devote towards CAT preparation. I finally got a decent percentile and moving forward, I finally got an admission offer from some prestigious colleges like FMS, IIM Lucknow, IIM Indore which made me realize that my hard work actually got paid off. And I decided to opt for the Faculty of Management Studies and am currently hoping for a great journey there.

DREAMS, DILIGENCE AND DILEMMA

-Sakshi
IIM Kashipur'23

Let's start by answering a simple question, why MBA? It's simple, I wanted to enter the corporate world and change my field. Next, how did I prepare for my CAT exam? It requires constant practice, perseverance, patience, and motivation. I started my preparation in the month of June. It was a bit tough to manage college and CAT preparation together but as the popular saying goes "Hard work always pays off", it was applicable in my case as well; I got calls from several B-schools and one more thing, I learned a new skill, Time Management! It was a dream of mine to get selected in one of the top B-schools. And I did that, but I only wanted one, not nine. Right after the interview result, a dilemma was awaiting me, which B-school are you going to choose? I did my research and finally, I chose IIM Kashipur!! Generally, people say that the journey of an MBA will change you but I would say that the journey of cracking a B-school has changed me.
Looking forward to a great journey ahead!!

ROAD TO CONFIDENCE

-Bharti Yadav
IIT Kharagpur'23

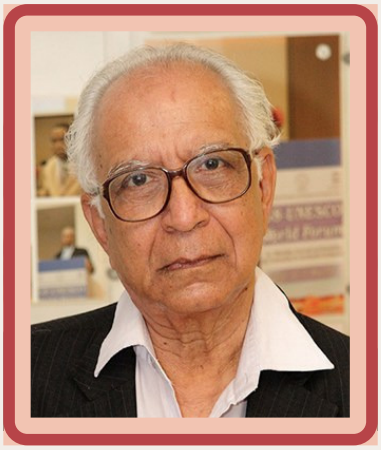
I appeared in IIT JAM 2021 for mathematics and secured AIR 421. Now I got admission to Joint M.Sc - Ph.D. Programme in IIT Kharagpur. I came to know about this exam from the teachers in my 1st year. Then I did some research about the career opportunities after pursuing a master's from IIT. Finally, I decided to pursue a career in the research field. Then after I joined the coaching institute, it indeed boosted my knowledge and helped me in better concept building. It also helped me to improve my calculation speed and raised my confidence level. During the days of my preparation, my focus was to maintain consistency in studies which later proved to be very useful to me. Also, my target was to solve different varieties of questions instead of solving the same type again and again. According to me, the final aim should be to develop an intuition that you begin to think of ways to solve a new problem as soon as you see it. Finally, it feels nice to continue my further studies in one of the most prestigious institutes of India and be tagged as an IITian.

LATE NIGHTS' WIN

-Nikita
IIT Indore'23

I am very glad that I have qualified for JAM 2021 with AIR 209 as this is the first time in my life that I have given any competitive exam and I got qualified in one go. I am very excited to study in one of the most prestigious institutes in the country. I want to extend my special gratitude to Pawan Sir and other teachers for giving me their valuable advice and guidance during the days of my preparation. Thank-You to my friends who helped me learn new concepts. And the best part of this journey that I enjoyed was solving doubt of each other and sharing our ideas, methods, and concepts till late at night and those late nights have paid off a good and exciting result. I'm looking forward to my journey now.

A Tribute



BY DEEPIKA YADAV

On 15th May 2021, India lost one of its most versatile and great mathematicians, **M.S. Narasimhan** to cancer. He was a towering figure in the mathematical world globally. He worked tirelessly throughout his life to give the world some very significant theories in the field of algebraic and differential geometry. The ability to understand and analyze his students made him a great teacher. His concerns went beyond his own country and he tried to uplift and help the students from underdeveloped and developing countries in the field of mathematics. He had the dexterity for solving problems and creating effective solutions.

M.S. Narasimhan was born on June 7, 1932, in a village named Tandarai, presently in Tamil Nadu. After finishing his education in his native village, Narasimhan joined Loyola College in Madras for his undergraduate education. There he studied under Father Charles Racine, a French Jesuit priest, who himself had been a student of the legendary French Mathematician Elie Cartan. Father Racine was good at identifying students and he encouraged Narashimhan to go to Tata Institute of Fundamental Research (TIFR), Bombay. He and C.S. Seshadri(another great mathematician) joined TIFR Mumbai in 1953. They were amongst the first graduate students of the school of Mathematics, headed by K.Chandrashekhran.

Narasimhan began his career in 1960 as a faculty at the TIRF. During this tenure, he studied some operators, basically elliptic and partial differential operators. He also went to France, where he researched specific elliptic operators and its associated theorems which eventually satisfied Cauchy – Schwarz inequalities. He did it by collaborating with Japanese mathematician Takeshi Kotake & was known as the Kotake – Narasimhan theorem. Furthermore, he has worked on a core theorem called the Narasimhan – Seshadri theorem in collaboration with Indian mathematician CS Seshadri which made a connection between differential geometry and algebraic geometry. He collaborated with R. R. Simha and proved the existence of moduli of general type complex structures on a real analytic manifold which later came to be known as Simha Narasimhan measures on Riemann. He was also the first chairman of the National Board for Higher Mathematics which was established in 1983 in India.

M. S. Narasimha was also a Fellow at the Royal Society, London, and was a recipient of the French National Order of Merit in 1989. In 1990, the Padma Bhushan was awarded to him which is India's third-highest civilian honor. Narasimha was also chosen as a recipient for the Shanti Swarup Bhatnagar Prize in 1975, the Third World Academy of Sciences Prize for Mathematics in 1987, the Srinivasa Ramanujan Medal in 1988, and the King Faisal International Prize for Science in 2006, an award which he won together with mathematician Simon Donaldson, Imperial College. As of the year 2021, Narasimhan was the only Indian to have won the King Faisal International Prize for Science.

Even after his retirement, he continued his role as a guide and a mentor for the Indian mathematical community. With him, an era of Indian mathematics also ended. He still serves as an inspiration to several people and his absence has left a void in the mathematical world across the globe.

Editor's Note

Muskan Raina, III Year

EDITORIAL TEAM

Awanya Dabas, II Year

Ayushi Rawat, III Year

Torsha Dwivedi, III Year

"The journey thus embarked has reached its culmination.
Sundry perspectives of great minds, with an unflinching determination.
Instrumental it has been to teach us- Collaboration and a sense of Association."

Greetings to Everyone!

It fills my heart with utmost jubilation as I take this opportunity to express my deepest gratitude to Dr. Haritma Chopra, our revered Principal, and a true visionary, Ms. Rajni Gupta, our zealous and intellectual HOD, Dr. Khushboo Bussi, who guided us through the journey and the cornerstone of every educational establishment - our worthy facilitators. It is with their persistent efforts, guidance, and supervision that our department has raised the bars of excellence and has enabled my teammates to carve a niche for themselves in their respective arenas.

It gives me immense pleasure to cherish and appreciate the hard work put in by each one of you out there, who have considered us worthy of becoming a conduit for their illustrious expressions. I would like to specially acknowledge my fellow teammates Awanya, Torsha, and Ayushi, who worked tirelessly in making this issue a success. We are honored by your humble submissions along with the time and faith invested in us.

We are equally indebted to all the avid readers who have been our best critiques, confidantes, and torchbearers through every thick and thin and have done a yeoman service in taking this expression series to a different level. Together, we can surely make a difference.

-MUSKAN RAINA