

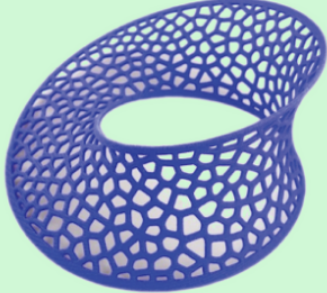


HSNC UNIVERSITY, MUMBAI
Kishinchand Chellaram College



Department of Mathematics

(Under the aegis of Star DBT Scheme)



Mathematics

presents

गणितम् **N**more





The science of mathematics has arisen from the needs of everyday life and has grown up day by day with the everyday life of the world.

I feel happy to see the Department of Mathematics going places this Academic year. The department of Mathematics was fortunate to be one of the Departments of K C College that was awarded the DBT Star Scheme by Department of Biotechnology, Govt. of India, this year. The funds were utilized by the department to carry out a myriad of activities which were aimed at enriching students' learning and experience by their participation in various activities and programs.

I congratulate the department for the launch of the department's newsletter, 'गणित्मNmore' which will showcase the achievement of the department periodically. It will also initiate the interest of students and faculty across disciplines towards the subject of mathematics.

With an assurance of my support for such commendable activities in the future, I once again congratulate the department and wish them success.

*--Dr. Hemlata Bagla,
Principal, KC College*



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It gives me great pleasure to see that the Department of Mathematics of K.C. College is launching its departmental newsletter 'गणित्मNMore'.

Mathematics is the crux of all progressive human activities. It enables us to understand and solve complex global issues. It is said that “The only way to learn Mathematics is to do Mathematics”.

The Department of Mathematics at KC College, under the aegis of the DBT Star Scheme, has actively been propagating the learning of the subject amongst its students. It has organised a number of events and invited stalwarts to interact with students, besides exposing students to the many interesting facets of the subject.

We look forward to many more exciting ventures by the Dept of Mathematics in the coming years. I convey my best wishes to the faculty and students of the department and extend our support to them in all their future endeavours.

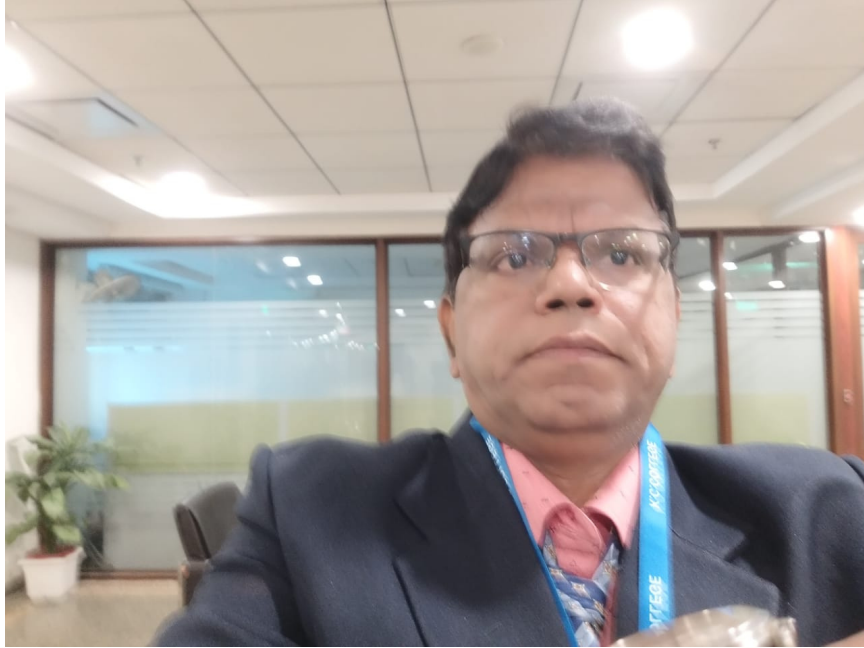
*--Dr. (Mrs.) Shalini R. Sinha,
Coordinator : Star DBT Scheme,
Vice Principal,
KC College*



The world of education is changing, all institutions are gearing to collaborate and evolve new modes of operations to cater to the demand and opportunities. All aimed at creating new experience. It's our stakeholders, especially our alumni, who will be instrumental in helping us be on top of our craft.

I wish all the Alumni and members of Department of Mathematics for this step in the right direction the very best.

*--Mr. Smarajit Padhi,
Vice Principal,
(Commerce Dept), KC College*



I wish the Department of Mathematics and its students all the very best in its maiden venture of e-newsletter titled 'गणित्मNmore'. Through this endeavour, the department gets an opportunity to bring out the hidden talents of students. It can connect with students and Alumni and bring out the creativity of students to the fore.

Congratulations and all the very best and I wish the Department to bring more such newsletters in the days to come.

*--Mr. Justin M. Nayagan
1/C Vice Principal,
(Accountancy Dept), KC College*

Editor's Note

The Department of Mathematics of K C College, is glad to publish this first issue of it's newsletter “गणित्म N More”.

We thank our Principal Dr.Hemlata Bagla for her co-operation and encouragement to materialize the idea of having a newsletter of the department of Mathematics of K.C. College.

This newsletter is published under the DBT Star Scheme. This first issue is alumni special which contains the articles, puzzles by alumni of the department.

We thank each one of them for their contribution. We hope to continue to have good fruitful association with our alumni in future.

- Editorial Board



EDITORIAL BOARD



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Mathematics Department Report

2019-2020

The Department of Physics, Mathematics, Computer Science and Information Technology, KC College has been granted Rs. 63 lakhs under the DBT Star Scheme by the Dept. of Biotechnology, Government of India, for the period 2019-2022.

Dept. of Mathematics has organized following activities:

Workshops for students

1. Workshop on “Python Programming” by Dr. Ajit Kumar, Associate Professor and Head, Department of Mathematics, ICT, Mumbai on 28/08/2020 and 30/08/2020, Type-S.Y.B.Sc. students and no. of beneficiaries-35
2. “Python: Applications to Mathematics”, workshop by Mr. Maunash Jani, Software Developer, Genius Lynx, on 25/11/2019, Type- F.Y.B.Sc. and S.Y.B.Sc. students, no. of beneficiaries-31
3. “Mathematics Problem Solving using Python” workshop by Mr. Maunash Jani, Software Developer, Genius Lynx, on 18/12/2019, Type- F.Y.B.Sc. and S.Y.B.Sc. students, no. of beneficiaries-40
4. Workshop for IIT-JAM (State Level) conducted by Mr. Shriprasad Tambe, Ms. Saeed Joshi and Ms. Samiksha Mahajan on 06/01/2020 and 07/01/2020, Type- S.Y.B.Sc. and T.Y.B.Sc. students, no. of beneficiaries-39

Projects



1. The research projects taken by F.Y.B.Sc students - Vedic Mathematics (Miss Siddhi Daphale, Miss Nishna Paria and Mr. Anush Shaikh), Differential Equation and applications (Mr Imran Ansari) under the guidance of Mrs. Gollakota Usha HVV.

Faculty Development Programs



1. FDP on Latex, was organized jointly with Department of Computer Science, by Mr. V. Nandagopal, School of Mathematics, TIFR on 7th February 2020, No. of Beneficiaries – 12.
2. FDP on NET & SET Examination Preparation (Mathematical Sciences) (State Level) was organized jointly with Department of Statistics, by Mr. Pritesh Kalan, Dr. Ganesh Phad, Dr. Nilesh Mundlik and Mr. Manish Agalave on 03/03/2020 No. of beneficiaries-33

Interdisciplinary Activities



1. Training in Documentary and Short-Film Making- "SCI-SHOTS" by Mr. Cyrus Dastur, on 19/11/2020, Type- S.Y.B.Sc. students across all departments (Mathematics, Physics, Computer Science and IT) No. of beneficiaries-90

2. Workshop “Group Discussion and interview skills” by Ms. Aman Kaur, on 05/02/2020 and 06/02/2020, Type- T.Y.B.Sc. (Computer Science) and T.Y.B.A.-(Economics) students. No. of beneficiaries- 21

Extension Activities

1. SHP CPCA Modules (Autumn School) "Goal Settings for Arts and Commerce Students" by Dr. Vineet Agrawal, on 15/10/2019 No. of beneficiaries-41
2. SHP CPCA Modules (Autumn School) "Goal Settings for Science Students" by Dr. Sharad Patel, on 15/10/2019 No. of beneficiaries- 41
3. SHP CPCA Modules (Autumn School) "Importance of Literature Review in Research" by Dr. Mayuresh Joshi on 16/10/2020 No. of beneficiaries- 41
4. SHP CPCA Modules (Autumn School) "Research Methodology" by Dr. Vivek Patkar on 16/10/2019 No. of beneficiaries-41
5. SHP CPCA Modules (Autumn School) "Advanced Communication Skills" by Ms. Shweta Raina on 17/10/2019 No. of beneficiaries- 41
6. Workshop on “Interview skills” by Ms. Aman Kaur on 06/12/2020 Type- S.Y.B.Sc. students No. of beneficiaries- 20

Institutional Visit



1. “Mathematical Modelling: Lab Visit” to ICT, Mumbai was done on 03/08/2019 Type- S.Y.B.Sc. students, No. of beneficiaries- 30

Lecture Series



1. Lecture Series “Applications of Mathematical and Statistical Tools to Finance” was organised jointly with Department of Accountancy, from 06/08/2019 to 10/08/2019 by Mr. Navin Punjabi, Ms. Jayashree Shetty and Ms. Nidhi Manchanda, Type- Students across all streams (B.Com., B.Sc., B.A.) No. of beneficiaries- 56
2. Lecture Series: “Mathematics for Actuarial Science” was conducted on 13/12/2019 and 23/12/2019 by Ms. Nidhi Manchanda, No. of beneficiaries- 23

Guest Lectures



1. Master Lecture: “Following the Trails of Square Root” by Dr. S. G. Dani, on 13/01/2020 Type-Faculty and students, No. of beneficiaries- 63
2. Online talk: “Use of Resampling in Population Estimation and Predicting the Risk of Extinction in Natural Populations: Two Case Studies” by Dr. Amiya Ranjan Bhowmick, Assistant Professor, Department of Mathematics, was conducted on Google Meet on 23/04/2020. Type- Faculty and students across all disciplines, No. of beneficiaries- 41

3. National Webinar: “Mathematical Models of Tipping Points in Ecosystem” by Dr. Vishwesh Guttal, Associate Professor, Indian Institute of Science, Bengaluru, organised jointly with Environment Committee, on World Environment Day 5th June 2020. Type: Faculty and students across all disciplines. No. of beneficiaries: 91

Students' Activities

1. MATHnAPP, Students' Seminar competition was organised as a part of “SCI-CODE # 19” an intercollegiate science fest on 21/12/2019. No. of teams- 6 (9 students)
2. MATHnAPP, Mathematical Modelling: Poster Competition was organised as a part of “SCI-CODE # 19” an intercollegiate science fest on 21/12/2019. No. of teams- 4 (5 students)

Outreach Activity

1. One Common Outreach activity was conducted with all the Star DBT departments. A number of academic equipment, books, and appliances were supplied to schools run by the Municipal Corporation of Mumbai. (Name of School – Valanai Colony School, Kandivali)

Activity for Non-Teaching staff

1. Laughter yoga session was conducted for non-teaching staff on 14/12/2019 by Mr. Aatmaram Torane, Mr. Nandakishore Bhat, Mrs. Seema Bhat. No. of beneficiaries: 14

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Glimpses of a few events

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"Master Lecture": By Dr.S. G. Dani



Lecture Series: "Applications of Mathematical & Statistical Tools to Finance"



Workshop for IIT-JAM (State Level)



Laughter Yoga Session for non-teaching staff



Workshop on Interview skills by our alumni Mrs. Aman Kaur (1995-1997)



FDP on Latex with hand on training session



Workshop on “Python Programming”



MATHnAPP: Students' Seminar and Poster Competition (Intercollegiate)



Workshop on “Python: Applications to Mathematics” by our alumni Mr. Maunash Jani (2009-2012)



Lecture Series: “Mathematics for Actuarial Science”



“Mathematical Modelling: Lab Visit” to ICT, Mumbai



ALUMNI

ARTICLES

Machine Learning is powered by Mathematics!

(-By Maunash Jani)

There are some common statements buzzing round like Mathematics of machine learning, Machine learning is math, machine learning in mathematics modelling and many more.

Machine learning is an application of artificial intelligence (AI) that enables systems the ability to learn and improve from knowledge, experience.

It is all about creating an algorithm that can learn from data to make a prediction. Predictions could be what an object in a picture looks like, what the next weather conditions would be.

Mathematics includes the study of such topics as quantity, structure, space, and change.

1. Selecting the correct algorithm which incorporates precision, formulating time, complexity.
2. Choosing parameter and validation techniques.

3. Identifying underfitting and overfitting of data.
4. Reckoning the correct certainty and uncertainty.

Machine learning is built on mathematical prerequisites and is powered by the diamond of:

--> **Statistics, calculus, linear algebra and probability.**

1. Statistics is at the core of everything.
2. Calculus tells us how to learn and optimize a model.
3. Linear algebra makes running these algorithms feasible on massive data sets.
4. Probability helps predict the likelihood of an event occurring.

Statistics is the field of mathematics which deals with the understanding and interpretation of data.

Statistical methods help in exploring the data during predictive modelling.

Exploratory data analysis, data summarization, and data visualizations can be used to help frame your predictive modelling problem and better understand the data. They can be used to clean and prepare data ready for modelling.

1] **Recommender systems**: Analysing the behaviour of the customer and their product ordering tendencies, and then trying to upsell by recommending them the related products. This can be done through the Apriori and FP-growth algorithms.

Example:

It includes the recommendation of books based on previous purchases and purchases by customers like you on Amazon, and the recommendation of movies and TV shows to watch based on your viewing history and viewing history of subscribers like you on Netflix.

2] Self-driving cars: Using reinforcement and supervised learning algorithms for learning the route.

Calculus is a set of tools for analysing the relationship between functions and their inputs. Typically, in machine learning, we find the inputs which enable a function to best match the data. Calculus - the study of change uses optimization techniques to discover the minimum value iteratively.

Machine learning uses derivatives in **optimization** problems. Optimization algorithms like gradient descent use derivatives to decide whether to increase or decrease weights in order to maximize or minimize a model's accuracy or error functions. Derivatives also help us approximate nonlinear functions as **linear functions**, which have constant slopes. With a constant slope we can decide whether to increase or decrease our weights on the slope to get closer to the target value or the class label.

Example: Gradient Descent

A gradient measures amount of changes in the output of a function if there is a small change in the inputs. Gradients generalize derivatives to scalar functions of several variables.

Thus, the process of learning to predict an output, whether that is a class (positive, negative) for a set of inputs or a continuous value such as the predicted price of a house, it all works like this:

1. Define a model
2. Define a loss function
3. Minimize the loss function using gradient descent

Linear Algebra:

Linear algebra is a sub-field of mathematics concerned with vectors, matrices, and linear transforms. It is a key establishment to the field of machine learning, from systems used to represent the task of algorithms to the usage of calculations in code.

The use of linear algebra houses when working with data, such as tabular datasets and images. An image is an example of a matrix from linear algebra. Operations on the image, such as cropping, scaling, trimming are described using the notation and operations of linear algebra.

Linear Algebra equation: $y = c + ax$

y is the output we want. x is the input variable. c = constant and a is the slope of the line.

Probability:

Probability theory can be defined as the study of how knowledge affects belief. Probability is the measure of likelihood of something we can use a probabilistic technique called logistic. Probability of an occurrence since the probability goes between 0 and 1.

Judea Pearl an ACM A.M. Turing Award Winner made it possible to create a viable ecosystem for Artificial Intelligence to succeed.

By using a scheme called Bayesian networks, he figured out how to program machines to relate a potential source to a set of observable conditions, which was the primary challenge in the field of AI research.

To summarize machine learning consists mainly of statistics, calculus, linear algebra and probability theory.

1. Statistics describes what the goal is.
2. Calculus describes how to optimize.
3. Linear algebra makes implementing algorithms feasible on massive data sets.
4. Probability helps predict the likelihood of a certain outcome.

Thus a career in Machine Learning requires a strong foundation in Mathematics.



Maunash Jani-

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My thoughts about "Mathematics"

(-By Aayam Saxena)

" Mathematics is the language that the universe speaks. In our day to day life, we often ignore the importance of mathematics. Without the subject, we won't be able to make progress in natural sciences, business, economics or any field of technology and development for that matter.

Nature is the result of mathematical intricacies. Many plants in nature are said to follow the Fibonacci Series. Spiders and honeybees make use of the mathematical symmetries.

Mathematics not only helps us to think analytically but makes us smarter in decision making.

We often tend to 'optimize' our daily life situations and this can be improved by having the knowledge of the subject. Lastly, from the point of view of a physicist, Mathematics is the foundation of all modern age progress.

Graham's Number

(-By Aayam Saxena)

This is a mind boggling number that threatens mathematicians. Sometimes when we talk about big numbers, we talk about how many digits they have or, basically equivalently, write them in scientific notation involving some power of 10. A googol for example, is 10^{100} , which has 101 digits! The largest known prime number has over 17 million digits. A googolplex is 10 raised to the googol power, which is 1 followed by googol digits! But these numbers can somehow be comprehended even though our calculators are too weak to calculate these numbers.

Graham's number is so strange that I cannot tell you how many digit it has. I can't tell you how many digits its number of digits has or how many digits its number of digits of its number of digits has. They're all too big. This number is so unimaginably big that if you were to fully comprehend its size, your brain would literally collapse into a black hole!

The official definition of Grahams number is abstract and of no use to non-mathematicians. It relates to the Ramsey Theory :

Connect each pair of geometric vertices of an n-dimensional hypercube to obtain a complete graph on 2^n vertices. Color each of the edges either red or blue.

What is the smallest value of n for which every such coloring contains at least one single colored complete subgraph on four coplanar vertices?

(Warned you about its abstractness)

The Notation for Grahams Number :

$$3 \uparrow 3 = 3 \times 3 \times 3 = 27 \text{ or } 3^3$$

$$3 \uparrow \uparrow 3 = 3 \uparrow (3 \uparrow 3) = 3^{27} = 7.6 \text{ Trillion}$$

$$3 \uparrow \uparrow \uparrow 3 = 3 \uparrow 3 \uparrow (3 \uparrow 3) = 3 \uparrow (3 \uparrow 27) = 3 \uparrow (7.6 \text{ Trillion}) \text{ or } 3^{7.6 \text{ trillion}} \text{ and so on..}$$

G1 = $3 \uparrow \uparrow \uparrow \uparrow 3$ = (This number is already big enough to break any calculator and is incomprehensible but its just the beginning!)

G2 = $3 \uparrow \uparrow \uparrow \dots \uparrow 3$ = Contains G1 arrows

G3 = $3 \uparrow \uparrow \uparrow \dots \uparrow 3$ = Contains G2 arrows

⋮

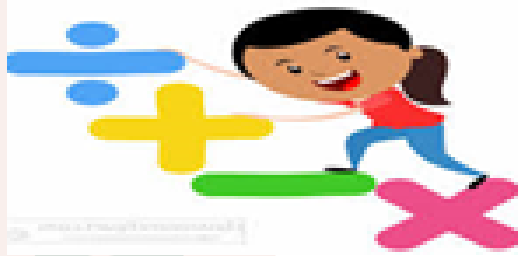
G64 = $3 \uparrow \uparrow \uparrow \uparrow \dots \uparrow 3$ = Contains G63 arrows!

This is the Grahams number. If we assume that the smallest volume (Planck's volume) of space occupies 1 digit of this number and we try to fill out the entire volume of the observable universe to represent this number then the space would fall short.

Despite this we know that this number is finite and is divisible by 3 and ends in 7. Indeed this is a beautiful manifestation of the power of mathematics in defining our reality and the universe.

Aayam Saxena-





My family of Indian Mathematicians

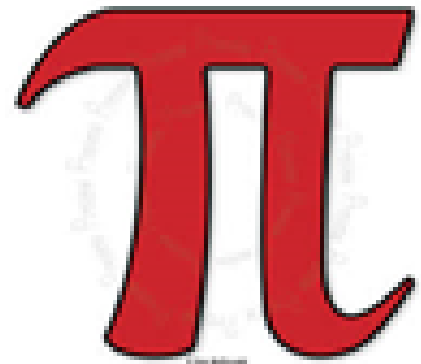
(-By Divya Srivastav)

$+$ $-$ \times \div \pm $>$ $<$	plus minus multiplied by divided by plus or minus is greater than is less than	$=$ \neq \sim \cong ∞ $>$ \geq	is equal to is not equal to is similar to is congruent to infinity is greater than or equals is less than or equals	\Leftrightarrow \Rightarrow θ \emptyset \triangle \forall π	is equivalent to implies theta empty set triangle or delta for all pi: 3.14159
\int \cap \cup	integral intersection of two sets union of two sets	$!$ \therefore $\sqrt{\quad}$	factorial therefore Square root of	\perp \exists $\%$	perpendicular exists percent
\overleftrightarrow{AB} \overline{AB} \overrightarrow{AB}	line AB segment AB ray AB	\angle \sphericalangle Σ	right angle angle sum of	$\{ \}$ $[]$ $()$	braces (grouping) brackets parentheses (grouping)

Aryabhata : First great scientist, astronomer and mathematician of ancient India.

He was born in 476 C.E. He studied in Nalanda University near Kusumaputra, which is now in Patna. He belonged to the gupta dynasty. He chose teaching as his career in mathematics and astronomy field. He was also called as kulapati, which means ‘head of the university’, so it was assumed that Aryabhata was the head of Nalanda University. Aryabhata earned great fame as a teacher of astronomy. He was referred as acharya professor).He wrote a book called Aryabhatiya

which covers arithmetic, algebra, plane trigonometry, and spherical trigonometry. It also contains continued fractions, quadratic equations, sums-of-power series, and a table of sines. His method to find solution for quadratic equations is, $ax \text{ (sq.)} - by \text{ (sq.)} = c$, also recognized world-wide.



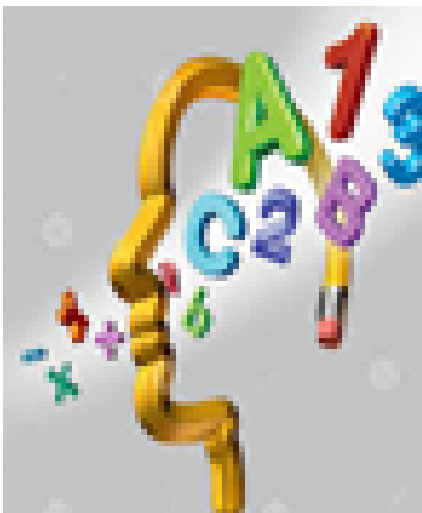
Invention of zero, geocentric model of the solar system and correct value of pie up to four decimals is widely known. Aryabhata's methods of astronomical calculations have been in continuous use for practical purposes of fixing the panchangam (Hindu calendar).

Shakuntala Devi: Human Computer

She was born on 4 november 1929 in Bangalore, Karnataka. She did not receive any formal education. She travelled the world demonstrating her arithmetic talents. On 18 June 1980, she demonstrated the multiplication of two 13-digit numbers— $7,686,369,774,870 \times 2,465,099,745,779$ —picked at random by the computer department of imperial college London. She correctly answered 18,947,668,177,995,426,462,773,730 in 28 seconds. This event was recorded in the 1982 *Guinness book of records*. Writer Steven Smith said, "The result is so far superior to anything previously reported that it can

only be described as unbelievable. She enjoyed studying Vedic Math. She explained many of the methods she used to do mental calculations in her book figuring: the joy of numbers. She explained how she did calculations using her subconscious mind and her tricks. She authored number of books in her later years, including novels as well as texts about mathematics, puzzles, and astrology. She wrote the book the world of homosexuals, which is considered the first study of homosexuality in India.

Brahmagupta:



The great Indian mathematician and astronomer Brahmagupta was born in 7th century. He was from the state of Rajasthan of northwest India (often referred to as Bhillamalacarya, the teacher from Bhillamala), and later became the head of the astronomical observatory at Ujain in Central India. Most of his works are composed in elliptic verse, a common practice in Indian mathematics at the time, and consequently have something of a poetic ring to them. Previously, the sum $3 - 4$, for example, was considered to be either meaningless or, at best, just zero.

He realized that there could be such a thing as a negative number, which he referred to as “debt” as an opposed to “property”. He expounded on the rules for dealing with negative numbers (e.g. a negative times a negative is a positive, a negative times a positive is a negative, etc.). In a quadratic equation with two possible solutions, one of which could be negative, his work on solutions to general linear equations and quadratic equations, systems of simultaneous equations and solving quadratic equations with two unknowns. He worked on Diophantine analysis, Pell's equation, Pythagorean triplets, Geometry, Mensuration, Trigonometry, Interpolation, Astronomy etc. Brahmagupta's theorem on cyclic quadrilaterals, his formula and other theorems are well known.

Mangala Narlikar :

She studied from the university of Bombay and received degrees of B. A. (Math) in 1962 and M.A. (Math) in 1964 with first rank and also won the chancellor's gold medal. She has worked and taught in both advanced mathematics and simple arithmetic. Her core fields of interest are real and complex analysis, analytic geometry, number theory, algebra and topology. She studied and wrote research paper on theory of sieved integers, on a theorem of Erdos

and Szemerédi, on the mean square value theorem of Hurwitz Zeta function, hybrid mean value theorem of L -functions, on orders solely of abelian group.

Bhaskara:



His work in calculus and how it is applied to astronomical problems and computations is what makes him immensely

popular. He was an expert in arithmetic, algebra, the mathematics of planets and spheres.

Hemchandra :

His work on the Fibonacci sequence even before Fibonacci himself. He worked with the cadences of length n . Well-known as a prodigy by his generations, earned the title Kalikālasarvajña, i.e. “the all-knowing of the Kali Yuga”.

Srinivasan Ramanujan :

Self-taught mathematician who coined the idea of “taxicab numbers”. He worked on analytical theory of numbers, elliptic functions, continued fractions, and infinite series. His contributions to the theory of numbers comprise pioneering discoveries of the properties of the partition function.

Satyendra Nath Bose :

Best known for his stupendous work in quantum mechanics, also developed the statistical mechanics for bosons of a photon gas. He collaborated with Einstein for Bose-Einstein statistics and the theory of Bose-Einstein condensate.

Sujatha Ramdorai :

She has worked on Iwasawa theory in the areas of algebraic theory of quadratic forms, arithmetic geometry of elliptic curves, the study of motives, algebraic theory of quadratic forms, arithmetic of algebraic varieties. First Indian to win the prestigious ICTP Ramanujan prize in 2006 and also recipient of the 2020 Krieger-Nelson prize for her exceptional contributions to mathematics.

*PC Mahalanobis, C.R.Rao, Raman Parimala,
Neena Gupta
and many more....*



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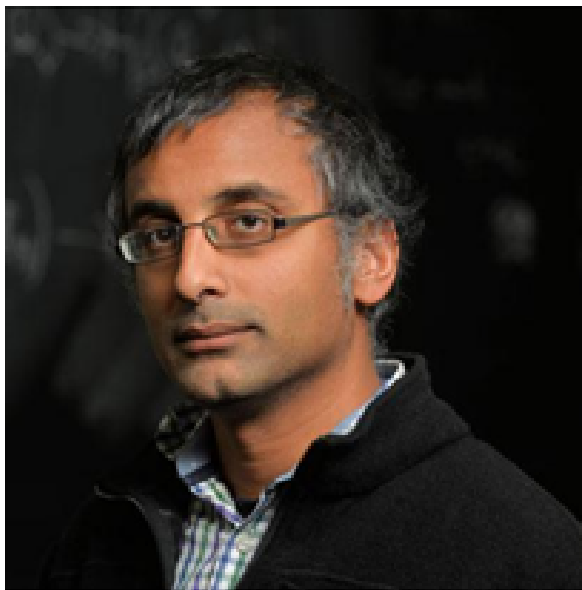
Divya Srivastav-

“News : Mathematics World”

Fields Medal 2018

(-By Aayam Saxena)

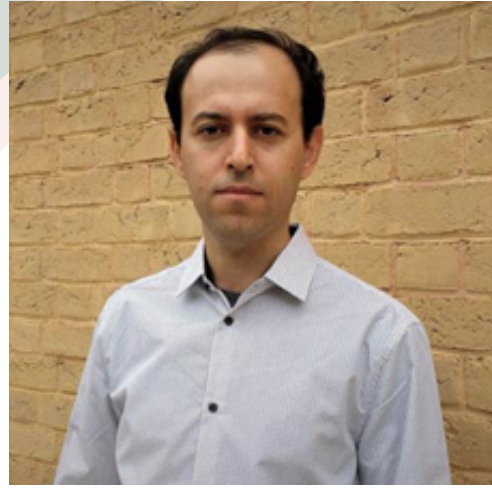
The Fields Medal is awarded to recognize outstanding mathematical achievement for existing work and for the promise of future achievement. The medals and cash prizes are funded by a trust established by J.C. Fields at the University of Toronto, which has been supplemented periodically, but is still significantly underfunded. The discrepancy in 2018 was made up by the University of Toronto and the Fields Institute.



Akshay Venkatesh

For his synthesis of analytic number theory, homogeneous dynamics, topology, and representation theory, which has resolved long-standing problems in areas such as the equidistribution of arithmetic objects.

For the proof of the boundedness of Fano varieties and for contributions to the minimal model program.



Caucher Birkar



Alessio Figalli

For contributions to the theory of optimal transport and its applications in partial differential equations, metric geometry and probability.

For transforming arithmetic algebraic geometry over p -adic fields through his introduction of perfectoid spaces, with application to Galois representations, and for the development of new cohomology theories.



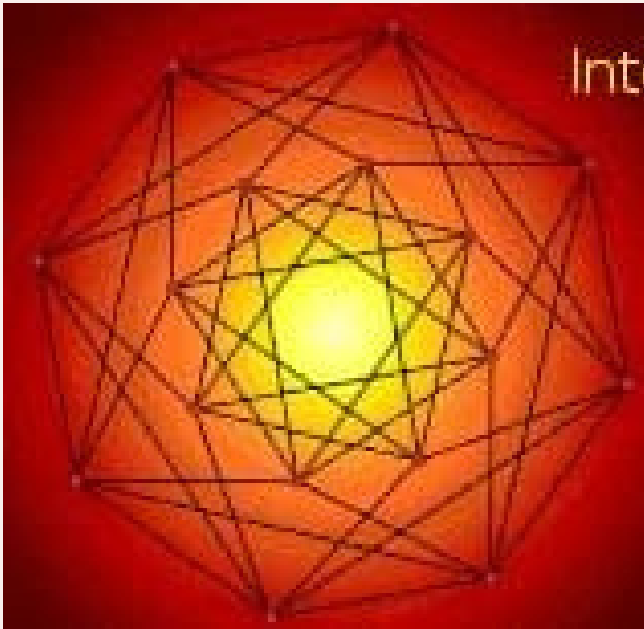
Peter Scholze

A Tribute to Professor Shrikhande

(-From Editor's Desk)



Professor Sharadchandra Shankar Shrikhande was the founding head of the Department Of Mathematics, University of Mumbai and the founding director of the center of Advanced Studies in Mathematics, Mumbai till he retired in 1978. He was a mathematician with notable work in combinatrics. Professor Shrikhande along with his mentor R.C. Bose and their collaborator E.T. Parkar disproved the work of the legendary Swiss mathematician Euler's Conjecture that there do not exist two mutually orthogonal Latin squares of order $4n+2$, for any n . He is also known for discovering the Shrikhande graph, which is used in Statistical designs.



Shrikhande Graph



After receiving his PhD degree in 1950, from the University of North Carolina he taught at various Universities in USA and then at Banaras Hindu University, before joining as the head of the newly formed Mathematics Department at Mumbai University in 1963. On 21st April 2020 he left this world at the age of 102. We at the department of Mathematics, K C College, Mumbai, convey our gratitude to this great mathematician.

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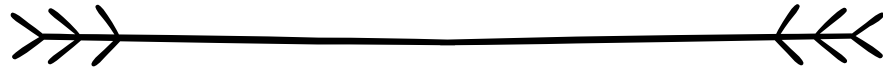
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“Have Fun with Maths”

Puzzle Corner



(-By Aayam Saxena)

1] 7 TEMPLES 7 RIVERS PROBLEM

Somewhere in the wonderland there are sequence of 7 Temples separated by 7 rivers, Sequence is Temple, River, Temple, River.....

A man has to put equal number of flowers on every temple but the catch is as he crosses the river, remaining flowers will be doubled (2 times) how many flowers should a man carry with him before entering into first temple so that till last river he is left with nothing?

Assume he took 5 flowers, on first temple he drops 2, remaining is 3 as he crossed the river it will become 6, he put same number of flowers (i.e 2 flowers) $6-2=4$ which again becomes twice in second river means 8...

2] CAR PARKING

One-tenth of the cars in a car park are yellow. Another car arrives and now one-ninth of the cars are yellow. How many cars are now in the car park?

3] DRAW ONE LINE ON THE EQUATION TO MAKE IT CORRECT

$$5+5+5+5= 555$$

4] HOW TO BEAT ROGER FEDERER AT WIMBLEDON?

Thanks to a set of temporary magical powers you are in the final of the Wimbledon tennis championships up against seven-time winner Roger Federer.

Your powers cannot last for the whole match and you must therefore choose the optimum time for them to run out. What is the score that gives you the maximum chance of winning?

5] SCHOOL LOCKERS

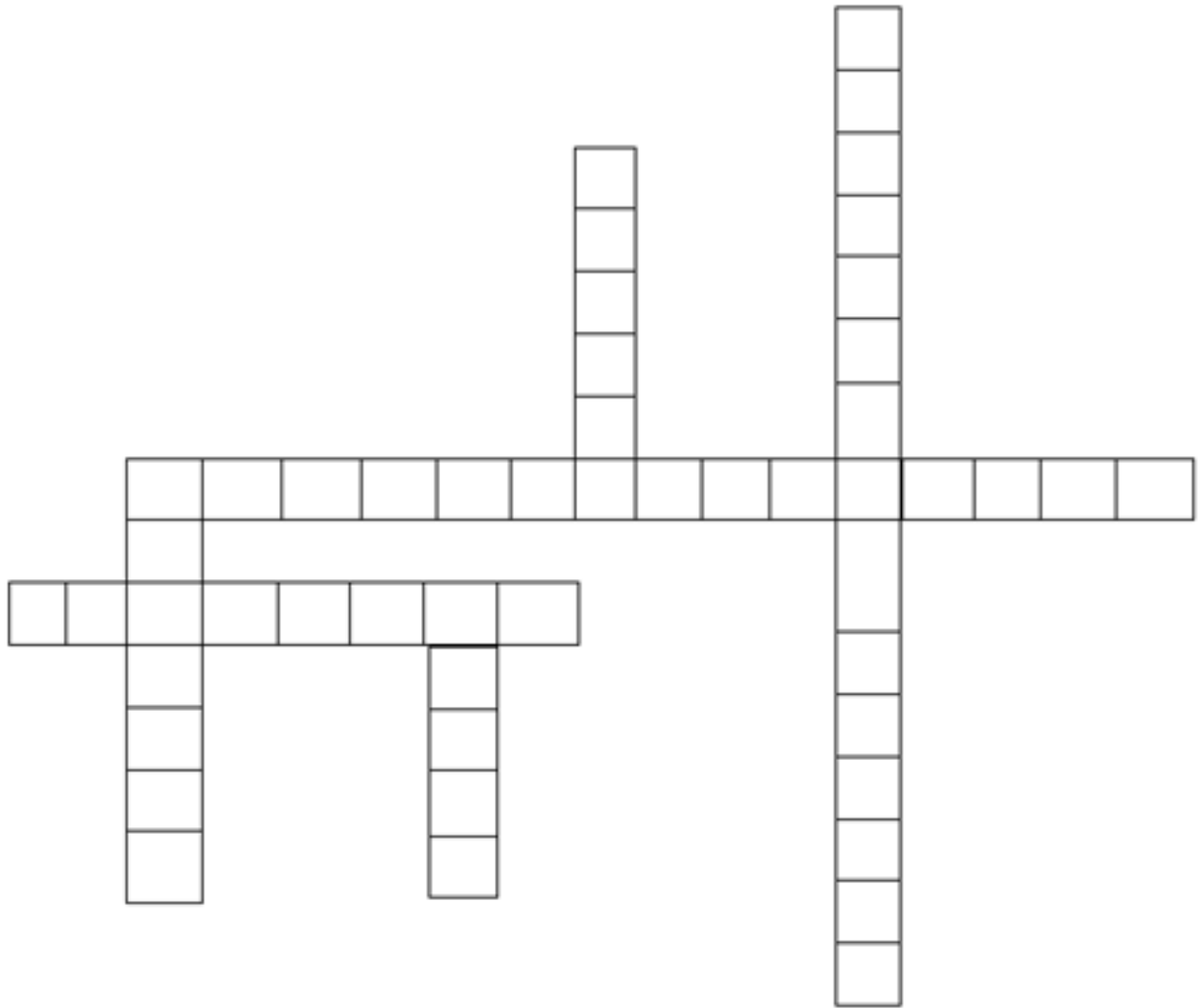
There is a school with 1,000 students and 1,000 lockers. On the first day of term the headteacher asks the first student to go along and open every single locker, he asks the second to go to every second locker and close it, the third to go to every third locker and close it if it is open or open it if it is closed, the fourth to go to the fourth locker and so on.

The process is completed with the thousandth student. How many lockers are open at the end?

CROSSWORD



(-By Dina Pankar)



- 1) He was born in Germany on September 17th, 1826 .
- 2) In 1846, spring term of University of Gottingen he studied
-----.
- 3) There he was mentored and facilitated in studying
mathematics by -----.

- 4) In 1847, earning his father's permission he transferred to University of _____.
- 5) He wrote his thesis on the theory of Complex variables, now called as _____.
- 6) He gave lecture course to only three people on Theory of _____.

Dina Pankar -



Answers:

- 1) RIEMANN
- 2) THEOLOGY
- 3) GAUSS
- 4) BERLIN
- 5) RIEMANN SURFACES
- 6) ABELIAN FUNCTIONS