



**Department of Mathematics  
Shivaji College, University of Delhi**

**2023-24**

**READ-O-MATH**

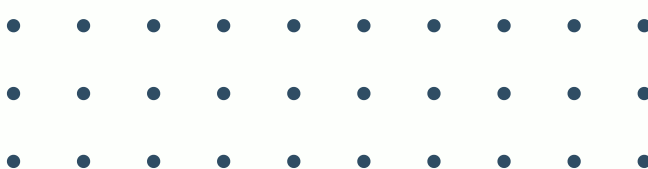
**The Annual Newsletter**

# TABLE OF CONTENTS



1	From Principal's Desk
2	Message from TIC
3	From the team of Newsletter
4	Faculty Members
6	Newsletter Team
7	Student Council
9	Department of Mathematics
10	INFINITY'23
13	Noor-E-Alvida
15	Teacher's Day

Euphoria	16
Photomatics	18
Paradoxes	19
Important Mathematics Days	33
The Numeric Times	36
Career Opportunities	39
Fact-0-Mania	40
Math Mania	41
Kalakari	42
Let's hear from our Seniors	43



# FROM PRINCIPAL'S DESK

Dear Students,

I am thrilled to extend my heartfelt congratulations on the release of the E-Newsletter 2023-24. Witnessing the continuation of this beloved tradition for yet another year fills me with profound pride and admiration. The E-Newsletter stands as a beacon of the Department's unwavering commitment to maintaining academic excellence.

Throughout this year, the Department has cultivated a vibrant learning environment that seamlessly integrates traditional methods with contemporary approaches. This fusion has fostered an atmosphere where innovation and exploration thrive.

This year holds special significance as Shivaji College joyously celebrated the 350th anniversary of the Coronation of Chhatrapati Shivaji Maharaj with the grand event, 'Shivraj 350'. As students immersed themselves in the philosophy of Shivaji Maharaj, they were profoundly inspired by his journey, indomitable spirit, struggle and unwavering determination.

It is truly inspiring to witness the exceptional commitment, passion, and creativity demonstrated by our students in their pursuit of academic excellence. The E-Newsletter serves as a tangible representation of our students' academic prowess and reflects the Department's ongoing efforts to provide a diverse and enriching educational experience.

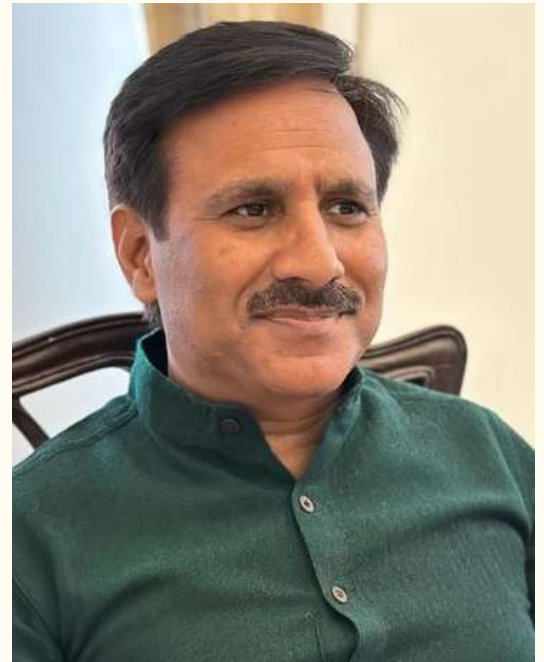
To all our students, I offer my heartfelt congratulations and best wishes for the exciting journeys that lie ahead. May you continue to ascend to greater heights and achieve extraordinary success in all your future endeavors.

Warm regards

Prof. Virender Bhardwaj

Principal

Shivaji College



# MESSAGE FROM TIC

Dear Students,

I am thrilled to extend my heartfelt congratulations to TESSERACT- The Mathematics Society of Shivaji College, for their outstanding contributions throughout the academic year 2023-24. The society's dedication to enhance the academic and holistic development of students through different ways and opportunities is truly commendable, reflecting their remarkable enthusiasm and exemplary teamwork. Leading such a talented and dynamic team fills me with pride.



Moreover, I am delighted to observe the continued tradition of the department's E-Newsletter for yet another year. This newsletter serves as a great platform for disseminating information about departmental events and activities, alongside featuring captivating articles and mathematical puzzles and much more. I extend my appreciation to the diligent efforts of the student council in producing this informative publication.

I wish to express my sincere gratitude to our Principal, Prof. Virender Bhardwaj, whose unwavering support has been instrumental in our endeavors. Additionally, I am thankful to my colleagues and the dedicated student team whose collective efforts have propelled Tesseract to become one of the most effective and efficient bodies within the college.

To all the students of the Department of Mathematics, I offer my warmest congratulations on your achievements thus far. I encourage you to persist in your pursuit of excellence in all your future endeavors.

Best wishes to each and every one of you.

Dr. Babita Gupta  
Teacher-In-Charge  
Department of Mathematics  
Shivaji College

# FROM THE TEAM OF NEWSLETTER

Dear Reader,

We are delighted to unveil the much-anticipated third volume of Read-O-Math, the annual newsletter epitomizing the dynamic essence of the Department of Mathematics at Shivaji College. Within these pages lies a rich tapestry woven with the diligent efforts and creativeness of every student within our esteemed department.

We extend our heartfelt appreciation to the dedicated team of Tesseract, whose unwavering dedication has elevated this newsletter to new heights with its collective brilliance.

From enlightening insights into the department's events to captivating diversions, from pioneering research endeavors to evocative expressions of art and photography, this newsletter proudly showcases the remarkable creativity and ingenuity of our students. While the sheer volume of submissions was indeed formidable, we were profoundly impressed by the caliber and originality exhibited.

As you embark on this enriching journey through the pages of Read-O-Math, we invite you to immerse yourself in this veritable cornucopia of creativity. May the voices resonating within these pages leave you inspired and spellbound.

We extend our sincerest gratitude to you for graciously dedicating your time to delve into the depths of Read-O-Math.

Feliz Lectura !

# **FACULTY MEMBERS: DEPARTMENT OF MATHEMATICS**



**Prof. Shiv Kumar Sahdev**  
Professor



**Dr. Babita Gupta**  
Associate Professor



**Dr. Aparna Jain**  
Associate Professor



**Prof. Mridula Budhraja**  
Professor



**Prof. Surbhi Madan**  
Professor



**Mr. A.K Jharwal**  
Assistant Professor



**Prof. Kumari Priyanka**  
Professor



**Mr. Jitendra Singh**  
Assistant Professor



**Dr. Vandana**  
Associate Professor



**Mr. Manish Kumar Meena**  
Assistant Professor

# **FACULTY MEMBERS: DEPARTMENT OF MATHEMATICS**



**Dr. Neetu Rani**  
Associate Professor



**Dr. Uttam Kumar Sinha**  
Assistant Professor



**Dr. Jeetendra Aggarwal**  
Associate Professor



**Dr. Deepti**  
Associate Professor



**Dr. Rashmi Agrawal**  
Assistant Professor



**Mr. Ankush Kumar**  
Assistant Professor



**Mr. Nitesh Kumar**  
Assistant Professor



**Mr. Chandra Prakash**  
Assistant Professor

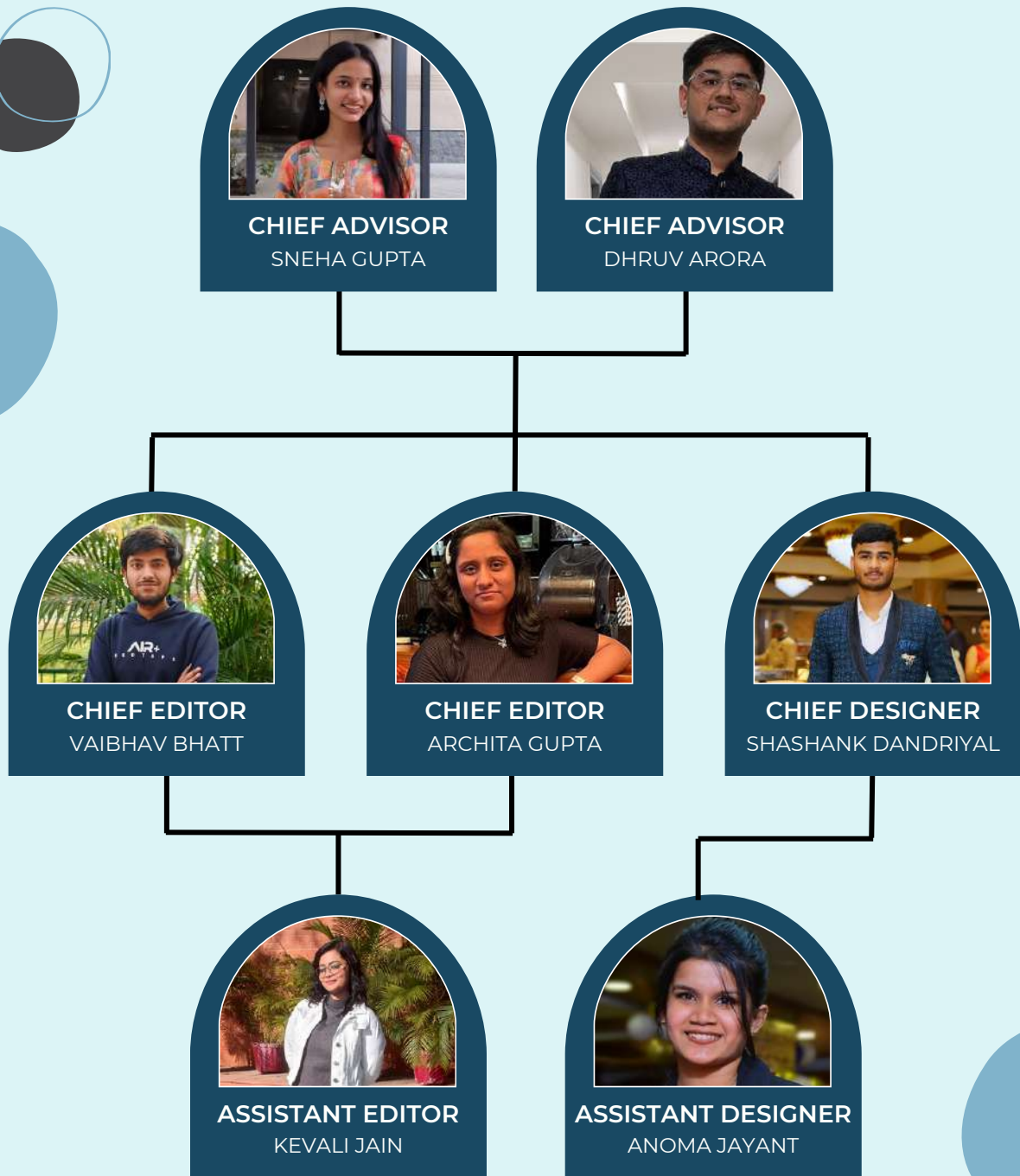


**Ms. Sunita**  
Assistant Professor



**Dr. Subedar Ram**  
Assistant Professor

# MEET OUR TEAM



## ASSISTANT EDITING TEAM

Harin, Abhradeep, Prabhat Kumar, Anurag, Shashwat, Kanishka, Rakhi, Prabhat Rastogi, Mohan

## ASSISTANT DESIGNING TEAM

Anshika, Ayushi, Manas



# STUDENT COUNCIL



**Sneha Gupta**  
President



**Raghav Anand Nath**  
Vice President



**Dhruv Gupta**  
Vice President



**Ashish Pal**  
General Secretary



**Bharat Singh**  
Joint Secretary



**Shashwat**  
Core Member

# STUDENT COUNCIL



**Shashank**  
Chief Technical Head



**Ayushi**  
Co Technical head



**Vaibhav**  
Chief Editorial head



**Archita**  
Co Editorial head



**Gul**  
Chief PR Head



**Chirag**  
Co PR Head



**Jayati**  
Chief Creative Head



**Anshika**  
Co Creative Head



**Anoma Jayant**  
Executive Member



**Nandini**  
Executive Member



**Mandeep**  
Executive Member



**Samridhi Jain**  
Executive Member



**Sneha Bhaskar**  
Executive Member



**Ansh Kumar**  
Executive Member

# DEPARTMENT OF MATHEMATICS



Mathematics is a fundamental discipline that serves as the cornerstone for numerous fields while also dynamically adapting to meet real-world challenges. The Department of Mathematics at Shivaji College exemplifies this adaptability, leading the way with innovative educational methodologies that fosters academic excellence while honing problem-solving and analytical abilities of the students.

The department's faculty members are not only distinguished experts in a wide array of topics including algebra, real analysis, partial differential equations and dynamical systems but are also deeply committed to fostering student growth and development. Their ongoing research keeps them at the forefront of mathematical advancements, ensuring that students receive the most relevant and up-to-date education possible.

In addition to academic pursuits, the department is dedicated to honing students' skills beyond the classroom. The inclusive environment of the department's society, "TESSERACT," provides students of all proficiencies with opportunities to enhance their writing, graphic design, social media management, leadership, and event planning skills. Through a variety of engaging seminars and events, including the annual departmental fest "INFINITY", students are encouraged to cultivate their creative thinking, public speaking, and leadership abilities.

# INFINITY' 23 ANNUAL FEST

On April 24, 2023, the Department of Mathematics at Shivaji College hosted its annual fest, "INFINITY," under the guidance of our esteemed Principal, Prof. Shiv Kumar Sahdev, and the Teacher InCharge of the Department, Dr. Deepti. The event kicked off at 10 a.m. with the traditional lamp lighting ceremony, followed by the enchanting Saraswati Vandana. We were honored to have Prof. C.S. Lalitha, Senior Professor, University of Delhi, as our Chief Guest. She was warmly felicitated by the revered principal. Following this, Prof. Lalitha conducted a captivating seminar on intriguing mathematics problems, inspiring students to delve deeper into such challenges.



The seminar was highly informative, and student engagement peaked during the lively Q&A session, where they had the opportunity to directly interact with the speaker.



This marked the conclusion of phase 1 for the fest, and at 11 a.m., the competitions commenced. The first event was the paper presentation round, offering students a platform to showcase their research and presentation skills. Under this, the participants delivered insightful presentations on various mathematical topics, captivating the audience with their depth of knowledge and clarity of expression.

Concurrently, the RuDoku competition, a fusion of Rubik's Cube and Sudoku, added an exciting dimension to the event. Participants demonstrated their exceptional analytical skills and strategic thinking, making the competition a thrilling experience for both contestants and spectators alike.



Moving further into the fest, the Maths Tambola and Poster Making rounds were held. These rounds added a fun twist to the proceedings, blending mathematical concepts with the creative skills of the participants. This created an aura of excitement and friendly competition, further enhancing the overall experience of the fest. Another competition that creatively blended mathematics with current trends was the reel-making competition.



Participants crafted entertaining short videos that not only had the audience in stitches but also provided informative content. The final two competitions of the fest were Puzzle Rush and Treasure Hunt that tested participant's wits by challenging them to solve confusing puzzles while also evaluating their collaborative skills.





Thus, the competitive aspect of the event culminated successfully and it was time to honor the winners of various competitions in the closing ceremony. During this, multiple certificates and prizes were distributed to acknowledge the extraordinary skills of the participants. Additionally, the student council members were also recognized with certificates for their consistent efforts in ensuring the smooth functioning of the event. Hence, the annual fest INFINITY was successfully executed, elevating the spirits of enthusiasm, creativity, and intellectual stimulation to new heights.



# NOOR-E-ALVIDA FAREWELL PARTY

As the class of 2023 bid farewell to the college, they left behind a rich tapestry of shared experiences, built over years spent together in classrooms and hallways. On May 2nd, 2023, we came together to honor their accomplishments and wish them success in their future endeavors.

Prior to commencing the ceremony, everyone gathered by the canteen to enjoy a delightful lunch. Subsequently, as a gesture of appreciation, seniors were greeted with treats before entering the auditorium, ensuring that their day was made memorable.



The farewell ceremony was a blend of captivating performances and heartfelt speeches, featuring musical acts and both senior and junior students showcased their talents through dance performances and entertaining games such as Balloon burst, Saree dressup, Pass the hoop, Test your bond and many more, evoking laughter and joy. A special ramp walk highlighted the seniors, with titles such as Mr. and Ms. Farewell, Ms. Chulbuli, Mr. Graduation Guru, Ms. Patola, Mr. Dapper and Farewell Favourite, adding flair to the event.

Amidst the festivities, our faculty members provided guidance, with our esteemed Principal delivering the formal farewell address. Teachers from the department shared fond memories and well wishes, while the seniors reciprocated with heartfelt speeches, setting an emotional tone for the evening.



As the event concluded, the DJ took charge, prompting everyone to dance with enthusiasm. We were moved to tears as we endeavored to encapsulate the significance of the moment, realizing that our cherished seniors would soon be parting ways. While we rejoice in their accomplishments, we also lament the void they will leave behind—the absence of shared moments at familiar spots like C-point, the canteen, and Hawa Mahal. It's a touching farewell, yet their memory will endure within us eternally.



With heartfelt regards,  
Your junior companions, who hold you dear beyond measure.





# TEACHER'S DAY



Teachers are the heartbeat of any educational institute, serving as mentors, guides, and a source of unwavering support for their students. From uplifting the spirits of a classroom to imparting knowledge, they play a pivotal role in shaping the emotional and social outlook of their students, instilling valuable life skills and moral values.

Teacher's day comes as a testament towards the profound impact they had and will continue to have in our society. It is also a day to honor and appreciate their hard work in shaping our lives. At Shivaji College, Department of Mathematics, we celebrated this special occasion with heartfelt gratitude. Students from all corners of the department came together to present roses to the teachers and participate in a joyous cake-cutting ceremony. This was a humble gesture to express our gratitude for the pivotal role they had played in shaping our lives.

# EUPHORIA 2023

## FRESHER'S PARTY

"Fresh beginnings hold the promise of endless possibilities. Make the most of this exciting time."

Fresher's day marks the beginning of an exciting journey where new faces are welcomed into the existing student communities. To celebrate such a wonderful occasion, on 26 October 2023 TESSERACT - The Mathematics Society, crafted a dazzling fresher's party - Euphoria, meticulously designed around the indo-western theme. The festivities for the party began with a delicious pre-event buffet, ensuring that the freshers were ready to dive in at 1 p.m. Following this buffet, they made their way into the auditorium where they were embraced with warm



smiles and welcomed with customized keychains and chocolate boxes. Dr. Babita Gupta, Teacher Incharge, Department of Mathematics, also addressed the freshers with words of encouragement, setting a tone for the evening that promised to be both memorable and enjoyable. Adding to the spectacle, seniors too showcased their creativity with charismatic dances, poetry and singing. The poetry recitation even elicited chuckles and smiles from the teachers. The event was further elevated by a soul-stirring musical performance by the college's music society, 'Reverb,' creating an atmosphere of pure joy and camaraderie.



Celebrating the freshers' individuality, titles like Mr./Ms. Freshers, Ms. Well Dressed, and Disco Dancer were also awarded, with each recipient receiving a beautiful gift hamper. This not only highlighted their talents and charisma but also nurtured a sense of belonging and unity within the campus community. It was a jubilant atmosphere, brimming with laughter, excitement, and joy as the cake-cutting ceremony crowned the finale of an unforgettable freshers' party. Finally, an exhilarating photoshoot and open DJ session captured the essence of the evening, fully embracing the euphoric spirit of the event and immortalizing these moments forever.



In the end, the party was successfully executed and left everyone ecstatic, creating enduring memories that will be cherished for years to come. It was a jubilant atmosphere, brimming with laughter, excitement, and joy as the cake-cutting ceremony crowned the finale of an unforgettable freshers' party. Finally, an exhilarating photoshoot and open DJ session captured the essence of the evening, fully embracing the euphoric spirit of the event and immortalizing these moments forever. In the end, the party was successfully executed and left everyone ecstatic, creating enduring memories that will be cherished for years to come.

# PHOTOMATICS



Winning Entry  
(Saurabh Singh Rathore)

The Department of Mathematics of Shivaji College organized its online submission based photography competition "PHOTOMATICS" on 23 February 2024. The theme of the competition was "CONCENTRIC PHOTOGRAPHY" which revolved around skillfully capturing images where the elements form spherical patterns with the shared center.

The competition received a mind blowing response from the students across different colleges and universities. The entries sent were absolutely marvelous and clearly showing the artistic skills of students in picturing. The entries were assessed on the basis of originality, creativity and relevance to the theme. The pictures exhibited a wide range of subjects from natural wonders to man-made structures.

Entries that showcased a thoughtful balance between artistic expression and Mathematical principles gained high praises. The winning entry along with the 4 best entries were posted on the social media handle, although it was really difficult to select the best from all the mesmerizing pictures. The photographs emphasized on the concepts like radial symmetry, spatial understanding, concentric figures along with our culture, heritage and the beautiful diversifying nature of Mathematics.

In conclusion, the competition proved to be a great fusion of art an mathematics. It served as a platform to recognize and appreciate the charismatic world of concentric photography. The Department plans to organize more such events to foster a creative culture within the Mathematics community.

# The Monty Hall's Paradox

Prabhat Kumar

## Background

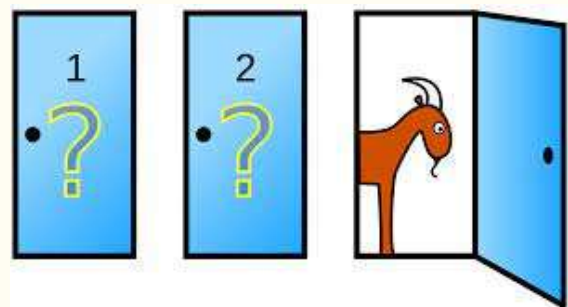
The Monty Hall's paradox, also known as Monty Hall's problem, is a problem derived from the game show, "Let's Make a Deal". The show challenged its participants to guess which closed door had a prize. Despite its seemingly straightforward nature, it held a problem that defied common intuition. Similar to optical illusions that play tricks on perception, the Monty Hall's problem presented a cognitive challenge where our statistical assumptions lead us astray.

## Problem Statement

In this problem, participants are presented with three doors, one hiding a prize and the other two concealing nothing. After selecting a door, but before opening it, the host opens one of the remaining incorrect doors, revealing an empty interior. This leaves the participant with a choice to either stick with their initial selection or switch to the other unopened door.



Despite the initial intuition that both doors now have an equal chance of hiding the prize (50/50), the truth is quite surprising. Opting to switch doors actually doubles the probability of winning the prize. This counterintuitive result stems from the initial  $1/3$  probability of selecting the correct door, which is then concentrated into the other unopened door after the host reveals one of the incorrect options.



## Empirical Solution

When Marilyn Vos Savant tackled this question in her Parade magazine column, she confidently advised readers to switch doors for a 66% chance of winning, a response that sparked widespread disbelief. Many notable individuals were swayed by the solution and only came to accept it after witnessing a computer simulation. Demonstrating the validity of this solution might seem daunting at first, but it's actually quite straightforward. By examining a simple table detailing the various combinations of choices and outcomes, the truth becomes clear.

Initial Choice	Prize Door	Don't Switch	Switch
Door 1	Door 1	Car	Goat
Door 1	Door 2	Goat	Car
Door 1	Door 3	Goat	Car
Door 2	Door 1	Goat	Car
Door 2	Door 2	Car	Goat
Door 2	Door 3	Goat	Car
Door 3	Door 1	Goat	Car
Door 3	Door 2	Goat	Car
Door 3	Door 3	Car	Goat
Total Wins		3 Wins (1/3)	6 Wins (2/3)

The table presents nine different scenarios based on initial door choice, the location of the prize, and the outcomes of "Don't Switch" and "Switch."

For each scenario, the table shows whether switching or sticking with the initial choice leads to a win. By tallying up the wins for each strategy, it becomes evident that switching doors doubles the probability of winning, as the final row of the table confirms.

## Reasoning behind the Empirical solution

This empirical demonstration helps us clarify that switching doors doubles the probability of winning. However, understanding the reason behind it can be challenging. To grasp the solution, we must first ask why the intuitive response of a 50/50 chance is incorrect. The human brain tends to rely on certain statistical assumptions, which can lead us to such scenarios. We often apply principles suitable for independent, random events, such as flipping a coin. In such cases, the probability of a specific outcome (like landing on heads) is calculated by dividing the number of favourable outcomes by the total number of outcomes, resulting in a probability of 0.5.

This logic leads us to believe that the two remaining doors in the Monty Hall problem each have a 0.5 probability of concealing the prize. However, this method only yields accurate results for processes that are truly random. Unfortunately, the Monty Hall problem does not meet this criterion.

## **Why the randomness assumption is false?**

The randomness in the Monty Hall problem occurs only in the initial choice of the door, where the probability of selecting the correct door is 0.33. The non-random aspect begins when Monty Hall, who knows the location of a prize, opens a door. Here, he strategically opens a door without the prize and this deliberate action causes the unopened door to have a higher probability of containing the prize.

## **Conclusion**

The Monty Hall problem's solution seems counterintuitive at first because our initial mental assumptions about how to solve it

do not match the actual process. We treat the problem as if it revolves around independent, random events. However, the key to understanding the solution is realizing that Monty Hall's insider information about the prize's location enables him to affect the outcomes intentionally rather than randomly.

Once we realize this, the solution to the seemingly perplexing problem becomes clearer. In simpler terms, at the start of the game, there's a 66% chance of picking a wrong door. If the player does pick a wrong door, the prize must be behind one of the other two doors. When Monty opens one of these doors (knowing it doesn't have the prize), it leaves only one unopened door. Because the initial chance of picking the wrong door was 66%, switching to the unopened door now gives a 66% chance of winning, as illustrated in the table.

## **Reference:-**

<https://statisticsbyjim.com/fun/monty-hall-problem>  
[https://en.m.wikipedia.org/wiki/Monty\\_Hall\\_problem](https://en.m.wikipedia.org/wiki/Monty_Hall_problem)

# The Interesting Number Paradox

-Anurag

## Introduction

Imagine you're on a quest to uncover the most captivating numbers in existence. You start by listing every natural number, hoping to pinpoint the truly remarkable ones. But as we methodically cross out the dull and uninteresting ones, we see a perplexing pattern emerging. The very act of crossing out seems to imbue a number with intrigue. This is the heart of the intriguing number paradox, a mathematical conundrum that challenges our perception of what makes a number truly interesting.

## Overview

The paradox poses a basic question. What is the smallest positive integer about which we cannot find something fascinating to say about? For example: Consider the number 1, it is interesting as it is a multiplicative identity; 2, as it the smallest and only even prime; 3, as it

the smallest odd prime; 6, a perfect number; 10, the fourth triangular number; 1729, the smallest number that can be expressed as the sum of two cubes in two distinct ways, and so on.

Each of these numbers holds a unique charm, a mathematical quirk that sets it apart. But as we delve deeper into the realm of numbers, we must inevitably encounter one that seems to defy our attempts to find it intriguing. So, can we crack the enigma? Which number manages to stay ordinary, defying our efforts to uncover its hidden charm?





## History

The interesting number paradox, also known as the "least number paradox" or "smallest number paradox," has intrigued mathematicians and philosophers for centuries. While its exact origins are difficult to trace, the concept can be traced back to ancient Greek mathematicians and philosophers. In the modern era, the paradox gained life through the musings of Edwin F. Beckenbach, who, in a 1945 letter published in *The American Mathematical Monthly*, proposed a whimsical "proof by induction" suggesting that every positive integer possesses an interesting fact associated with it.

This playful conjecture led to a cascade of contemplation and debate among mathematicians. Constance Reid immortalized the paradox in the first edition of her beloved mathematics book, *"From Zero to Infinity,"* in 1955, though it later vanished from subsequent editions.

Martin Gardner, in his iconic *Scientific American* column in 1958, cleverly labelled the paradox a "fallacy," weaving it into a tapestry of astonishing assertions whose proofs were subtly flawed. Despite its light-hearted beginnings, the paradox sparked serious reflection, with Gerg Chaitin in 1977 drawing a parallel between Gardner's formulation and an earlier paradox posed by Bertrand Russell regarding the existence of the smallest undefinable ordinal. This enduring puzzle continues to intrigue and inspire, reminding us of the boundless depths of mathematical curiosity.

## Answer to the Paradox

The solution of the interesting number paradox comes from a clever contradiction. If we assume there's a set of uninteresting natural numbers, then there must be a smallest uninteresting number. But here's the kicker: by being the smallest uninteresting number, it suddenly becomes intriguing!

## Conclusion

In conclusion, the interesting number paradox serves as a fascinating exploration into the subjective nature of what we find captivating in mathematics. It challenges us to reconsider our assumptions about numbers and their inherent interest, reminding us that complexity and intrigue can be found in even the simplest of mathematical concepts. This paradox highlights the beauty of mathematical reasoning and

of fascination, just waiting to be discovered. the endless mysteries that numbers continue to present. As we ponder the enigmatic question of the smallest uninteresting number, we are reminded of the endless possibilities and surprises that the world of mathematics has to offer, inviting us to delve deeper into its complexities with a sense of wonder and curiosity.

This paradoxical loop-de-loop shows that our assumption of a number being dull is flawed. This paradox also hints at a deeper truth that maybe we can't neatly classify numbers as interesting or uninteresting after all. Perhaps every natural number holds a hidden spark



# The Newcomb Paradox

-Abhradeep Sarkar

## Introduction

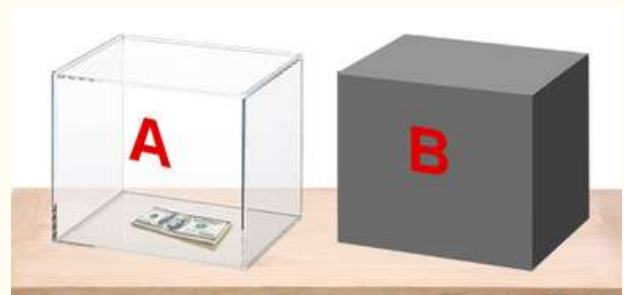
The Newcomb's paradox is a captivating puzzle that blends philosophy with mathematics. It introduces a scenario where two players engage in a game, with one player possessing the uncanny ability to forecast the future. Crafted by William Newcomb at the Lawrence Livermore Laboratory, this paradox gained prominence through Robert Nozick's philosophical exploration in 1969, later gracing the pages of *Scientific American* in March 1973 through Martin Gardner's "Mathematical Games." Today, it remains a hotly contested topic within the realm of decision theory, sparking fervent debate and speculation.

## The Core problem

At its core, Newcomb's paradox revolves around a decision-making scenario involving two boxes labelled A and B.

Box A is transparent and always contains a visible \$1,000 while box B is opaque and can either be empty or contain \$1,000,000, depending on a predictor's prediction about the player's choice. If the predictor believes the player will choose both boxes, box B will be empty and if it believes the player will choose only box B then it will contain \$1,000,000. Now, both the opaque and transparent boxes are kept on a table and the player has two choices:

- Pick box B.
- Pick both the boxes.



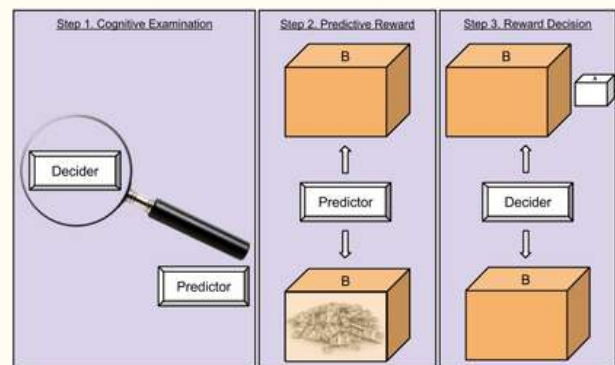
The paradox emerges when the player has to decide whether to take only Box B (potentially gaining \$1,000,000) or take both boxes (guaranteeing \$1,000 but potentially losing \$1,000,000). It stems from the dilemma: should they trust the predictor's accuracy and take only Box B, or should they take both boxes to secure the \$1,000?

Nozick observed a near-even split among people's choices, with each side often considering the other as irrational. The scenario triggered disagreement due to two conflicting intuitions that is:

- Expected Intuition: Take the action with the greater expected outcome.
- Maximizing Intuition: Take the action which, given the current state of the situation, guarantees you a better outcome than any other action.

The "Expected Intuition" has the inclination that advocates taking one box for its potentially greater outcome, which is altruistic in nature, while the "Maximizing Intuition" intuition leans toward taking both

for guaranteed gains, which is selfish in nature. The mechanics of this thought experiment are presented below:

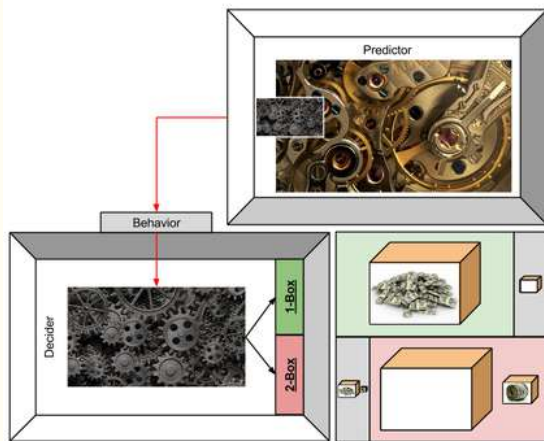


Now, let us try to solve the problem using game theory. By considering a decision matrix, it becomes evident that opting for one box often outperforms choosing both, aligning with the first intuition. However, the accuracy of the predictor significantly influences the decision. With perfect prediction, the one-box strategy dominates; conversely, imperfect prediction tilts the scale toward two-boxing.

## Final Reflection

The intricacies of Newcomb's problem reveal a fascinating recursion: the accuracy of the

predictor hinges on its modelling of the decision-making process. Illustrated in a comprehensive diagram, the Predictor constructs a model of the individual's cognitive abilities through observed behaviour.



However, even if they possess such control over their thought process, a perfect Predictor will anticipate and account for it. Consequently, the decision-maker may strategize to alter their decision based on the outcome of a coin flip, attempting to disrupt the predictor's knowledge. In essence, the decision-maker endeavours to manipulate the predictor's understanding through altering their thought process without being detected by the predictor's predictive abilities.

As the model's fidelity improves with more data from the decision-maker, represented by the red arrow, the Predictor's predictive accuracy increases, leading to smaller grey outcome rectangles.

Contemplating the options, the decision-maker may wish for their mind to favour the altruistic intuition during prediction and lean towards the selfish maximization intuition during decision-making in order to outsmart the predictor and secure a larger reward.

# Cramer's Paradox

-Shashwat Mishra

Cramer's paradox, named after Gabriel Cramer, a Swiss mathematician, refers to a situation in linear algebra where a system of linear equations has more equations than unknowns, yet it can still have infinitely many solutions or no solutions at all. This seemingly contradictory scenario arises due to dependencies or inconsistencies among the equations. Cramer's paradox highlights the importance of understanding the relationships between equations in a system.

## Introduction

In the realm of mathematics, Cramer's paradox, also known as the Cramer-Euler paradox, asserts that the quantity of intersection points between two curves of higher order in a plane can exceed the typical number of random points required to define a single curve. This concept is attributed to the Swiss mathematician Gabriel Cramer.

The Cramér-Euler Paradox arises from a discrepancy between the expected number of points needed to uniquely determine a curve of a certain degree and the number of points where curves of that degree can intersect. Typically, a curve of order  $n$  is determined by a formula involving  $n(n+3)/2$  points. For instance, a conic section requires five points, and a cubic curve would need nine.

However, according to the Maclaurin-Bézout theorem, two curves of degree  $n$  intersect in  $n^2$  points. Therefore, two cubic curves could intersect in nine points, which seems to contradict the notion that nine points are sufficient to uniquely determine a cubic curve.

This paradox was first highlighted by Stirling and later clarified by Plücker.

## Understanding Cramer's Paradox:-

Cramer's Paradox delves into the intricacies of algebraic plane curves defined by polynomial equations. These curves represent a collection of points in the Cartesian plane where the polynomial equation equals zero. The degree of a curve is determined by the highest sum of powers of  $x$  and  $y$  within the polynomial. For instance, a curve described by  $(x^4y^3 - 9x^2y + 3xy^2 - 5 = 0)$  is of degree 7. The general polynomial of degree  $d$  comprises terms of the form  $(c_{ij}x^iy^j)$  for non-negative integers  $i$  and  $j$ , satisfying  $(i + j \leq d)$ . This general polynomial of degree  $d$  consists of  $(1 + 2 + \dots + d + (d+1) = (d+1)(d+2)/2)$  terms, each with an independent coefficient. However, by setting this polynomial to zero, we can divide through by any non-zero coefficient, thereby reducing the number of arbitrary coefficients by one, resulting in  $(d(d+3)/2)$  free coefficients.

When considering  $(d(d+3)/2)$  arbitrarily selected points on the plane, inserting their coordinates into the polynomial  $(C(x, y) = 0)$  yields  $(d(d+3)/2)$  linear equations with the same number of unknown coefficients. Consequently, we can solve for these coefficients, providing the unique polynomial of degree  $d$  passing through those  $(d(d+3)/2)$  points. However, this leads to a paradox when juxtaposed with Bezout's Theorem. According to Bezout's Theorem, two algebraic curves of degree  $m$  and  $n$  intersect in exactly  $mn$  points. Therefore, two curves of degree  $d$  intersect in  $d^2$  points. For  $d = 1$ , there is a unique curve passing through any two given points, while for  $d = 2$ , a unique curve passes through any five points. However, for  $d = 3$ , a unique cubic curve passes through any nine given points, and any two cubic curves intersect in nine points. This apparent contradiction is known as Cramer's paradox.

A resolution to this paradox, provided by Cramer and later expanded by Julius Plucker, involves considering sets of points and the degrees of freedom associated with them. For instance, considering two quartics, while 14 points determine a quartic, 13 points determine a one-parameter family of quartics, each passing through the 13 given points. This understanding clarifies the relationship between the number of points and the degrees of freedom in defining algebraic curves.

### **Understanding Cramer's Paradox:-**

Cramer illustrated the concept using cubic curves in correspondence with Euler. He noted that the cubic curves  $x^3 - x = 0$  and  $y^3 - y = 0$  intersect at exactly nine points. Each equation corresponds to a set of three parallel lines:  $x = -1, x = 0, x = +1$ , and  $y = -1, y = 0, y = +1$ , respectively. This demonstration highlights that nine points may not be adequate to unequivocally define a cubic curve, especially in exceptional scenarios like these.

### **Conclusion:-**

In conclusion, Cramer's paradox highlights the intricacies of defining curves in mathematics, particularly when considering the intersections of higher-order curves. Despite the conventional expectation that a certain number of points are needed to uniquely determine a curve, the paradox demonstrates that the number of intersection points between curves can exceed this requirement. This phenomenon challenges our intuitive understanding of curve determination and underscores the importance of deeper analysis in mathematical investigations.



# Russel's Paradox

-Harin Jain

## Russell's Paradox: A Dilemma in Set Theory

Russell's paradox, also known as Russell's antinomy, was first published by the British philosopher and mathematician Bertrand Russell in 1901. This paradox highlights a fundamental issue in set theory, demonstrating that certain formulations lead to self-contradictory conclusions.

The paradox arises from the concept of the unrestricted comprehension principle, which states that for any well-defined property, there exists a set containing all and only the objects that possess that property. Russell's formulation involves considering the set  $R$ , defined as the set of all sets that do not contain themselves. If  $R$  is not a member of itself, then by its definition, it must be a member of itself. Conversely, if it is a member of itself, then it cannot be a member of itself, leading to a contradiction.

Furthermore, Russell showed that a similar paradox could be derived within the axiomatic system developed by the German philosopher and mathematician Gottlob Frege. This discovery undermined Frege's attempt to establish mathematics on a logical foundation, casting doubt on the entire logicist program.

In response to this paradox, two influential solutions were proposed in 1908: Russell's type theory and Zermelo's set theory. Russell's approach involved modifying the logical language itself, while Zermelo restricted the comprehension principle in his set theory axioms. Eventually, with contributions from Abraham Fraenkel, Zermelo's set theory evolved into the standard Zermelo-Fraenkel set theory (ZFC), which is widely accepted today. Informally, Russell's paradox can be understood by considering the distinction between "normal" and "abnormal".

sets. Most sets encountered in practice are "normal" (i.e., not members of themselves), while a set that is a member of itself is considered "abnormal." However, when considering the set of all normal sets, denoted as  $R$ , a contradiction arises. If  $R$  is normal, it must be abnormal since it contains itself, but if  $R$  is abnormal, it cannot contain itself, leading to a paradoxical situation where  $R$  is neither normal nor abnormal.



those men who do not shave themselves. The paradox arises when considering whether there exists a barber in this group who does not shave himself, leading to a logical contradiction.

### Russell's Paradox

In Russell's paradox, both implications

$$S \in S \rightarrow S \notin S \text{ and } S \notin S \rightarrow S \in S$$

are proved, and the contradictory conclusion

$$\text{neither } S \in S \text{ nor } S \notin S$$

is therefore deduced. In the situation in which all sets under discussion are subsets of  $U$ , the implication  $S \in S \rightarrow S \notin S$  is proved in almost the same way as it is for Russell's paradox: (Suppose  $S \in S$ . Then by definition of  $S$ ,  $S \subseteq U$  and  $S \notin S$ . In particular,  $S \notin S$ .)

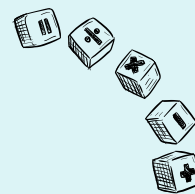
## Example

An illustrative example of this paradox can be seen in the scenario of a group of barbers who shave only



## Fibonacci Day

Fibonacci day is celebrated on the 23rd of November each year (11/23). The date corresponds to the first number of Fibonacci sequence. The Fibonacci sequence is a well-known sequence in mathematics. Each number in Fibonacci sequence results from the addition of the two numbers before it. In addition to its mathematical beauty, Fibonacci sequence shows significant importance in mathematical structures and natural patterns.



## Palindrome Day

Palindrome Day is a date that looks like a palindrome. It is written as mm/dd/yy for a palindrome form. Palindromes are symmetrical because they read the same way forward and backward. The last Palindrome Day was celebrated on 2/20/2022 and the next Palindrome Day is coming up on 4/20/2024.



## Square Root Day

Square root day is the most unusual mathematical day because it can't be celebrated annually. In fact, it only occurs 9 times in a century. It's celebrated on days when the last 2 digits of the date and month of the year are the square roots of the day. The last Square Root Day was celebrated on April 4, 2016. The next Square Root Day will be on May 5, 2025.





# THE NUMERIC TIMES

Mathematics will be used to develop more efficient and safer AI models. The University of Oxford is to share a major £80 million investment announced to develop next-generation artificial intelligence (AI) technologies. Although based at Oxford, the hub will have a broad geographic coverage across the UK, bringing together leading experts in the mathematical, algorithmic, and computational fields underpinning AI and machine learning systems as well as their applications in scientific and industrial settings.

Close links with a range of industry partners will enable the research team to test promising models in applied settings, and achieve early impact.

2023-24 Edition



## UKRI ANNOUNCES £80 MILLION INVESTMENT IN OXFORD-LED INITIATIVE TO ADVANCE AI THROUGH MATHEMATICS

UKRI (United Kingdom Research and Innovation) is supporting researchers and innovators to develop the next generation of AI technologies that will transform the economy and society. The investments announced will help to deliver the capability the UK needs to realize the opportunities of this transformative technology.

## **RESEARCHERS DEVELOP ALGORITHM TO CREATE TRAJECTOIDS, SHAPES CAPABLE OF ROLLING DOWN PREDETERMINED PATHS**

Researchers discover algorithm to create shapes that roll down predetermined paths. The team of researchers was led by Bartosz Grzybowski, distinguished professor at the Institute for Basic Science in Korea and included first authors like Yaroslav Sobolev and Ruoyu Dong. A perfect cylinder rolls down an inclined plane in a straight line, whereas a cone rolls in a curve. To get a ball of malleable clay to roll down a simple path, we can force it down a specific path once, squashing it as we go. Now, when we take it to the top again and restart from the initial starting point on the ball's surface, it will roll down the same path. The researchers took this principle to develop an algorithm that could produce a shape capable of following almost any predetermined path, even making the weird-shaped solids out of 3D-printed plastic and solid ball-bearings (for weight) to prove the point. The resulting objects, which they call "trajectoids," could have applications in understanding quantum mechanics and helping improve magnetic medical imaging.

## **NEW SHAPE ANSWERS A 50-YEAR-OLD GEOMETRY MYSTERY**

A group of scientists have discovered a new shape with 13 sides, named 'the hat'. It is the first Einstein tile to have been found: a shape that can cover a plane without overlapping, leaving gaps, or repeating patterns. An Einstein is a type of aperiodic tiling, which is a single shape that can cover a plane without overlapping, leaving gaps, or repeating patterns. Aperiodic tiling will help physicists and chemists understand the structure and behaviour of quasicrystals, structures in which the atoms are ordered but do not have a repeating pattern. And the newly discovered tile might be a springboard for innovative art.

## **INTERDISCIPLINARY TEAM DISCOVERS SURPRISING LINK BETWEEN PURE MATHEMATICS AND GENETICS, UNVEILING INSIGHTS INTO NEUTRAL MUTATIONS AND ORGANISM EVOLUTION**

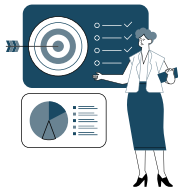
An interdisciplinary team of mathematicians, engineers, physicists, and medical scientists have uncovered an unexpected link between pure mathematics and genetics, that reveals key insights into the structure of neutral mutations and the evolution of organisms. They discovered a connection between the sums-of-digits function from number theory and a key quantity in genetics (the phenotype mutational robustness). This quality is defined as the average probability that a point mutation does not change a phenotype (a characteristic of an organism). But the existence of these neutral mutations posed an important question: what fraction of mutations to a sequence are neutral? It is precisely this question that the team answered. They proved that the maximum robustness is proportional to the logarithm of the fraction of all possible sequences that map to a phenotype, with a correction that is given by the sums of digits function  $s_k(n)$ , defined as the sum of the digits of a natural number  $n$  in base  $k$ . For example, for  $n = 123$  in base 10, the digit sum would be  $s_{10}(123) = 1 + 2 + 3 = 6$ . Another surprise was that the maximum robustness also turns out to be related to the famous Tagaki function, a bizarre function that is continuous everywhere, but differentiable nowhere.

## **BREAKTHROUGH IN GRAPH THEORY**

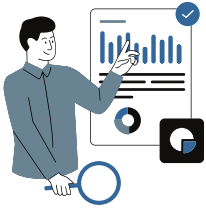
One of the biggest mathematical discoveries of the past year was in graph theory where the proof of a new, tighter upper bound to Ramsey numbers was found. These numbers measure the size that graphs must reach before inevitably containing structures called cliques. The discovery, announced in March, was the first advance of its type since 1935.



# Exploring Career Opportunities for Mathematics Graduates



Are you a mathematics graduate seeking to carve out a fulfilling career path? The world of opportunities awaits! Mathematics is not just about numbers; it's a gateway to various sectors where analytical thinking, problem-solving, and mathematical prowess are highly valued. Whether you're inclined towards academia, research, finance, information technology, or beyond, your mathematical skills can open doors to diverse and rewarding career paths.



## ACADEMIA AND RESEARCH:

- **Mathematician:** Dive into the world of theoretical mathematics, developing new theories, algorithms, and practical solutions across various domains such as business, finance, chemistry, and climate science.
- **Academician:** Inspire the next generation by sharing innovative ideas and methodologies in mathematics. Teaching positions offer the chance to communicate complex concepts effectively while staying abreast of the latest developments in the field.



## HEALTHCARE AND BIOLOGY

- **Biomathematician:** Bridge the gap between mathematics and biology by teaching and researching areas like computational neuroscience, mathematical physiology, and population dynamics.
- **Biostatistician:** Merge statistical analysis with healthcare, exploring numerical-based mathematics to study diseases, analyze medical data, and drive evidence-based interventions for improved healthcare outcomes.



## PUBLIC SECTOR AND CIVIL SERVICES

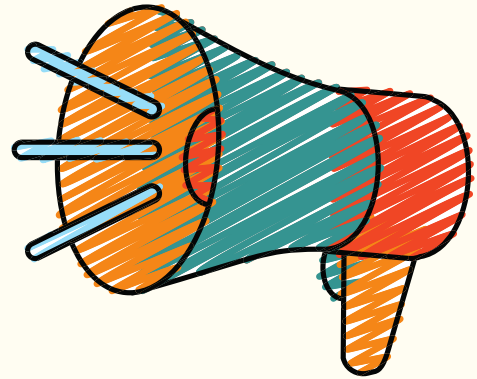
- **Public Sector Banks:** Contribute your mathematical skills to financial modeling and analysis in government organisations such as RBI, SBI, and nationalized banks.
- **Civil Services:** Pursue a career in civil services by leveraging your mathematical background in roles like IAS, IPS, or IRS. Serve the nation while applying analytical thinking to address societal challenges.



## FINANCE

- **Statistician:** Delve into the realm of statistics, where mathematics meets data analysis. Utilise your mathematical expertise to gather, interpret, and derive insights from data, with opportunities in both the private and government sectors.
- **Investment Banking:** Combine your love for numbers with a career in finance. As an investment banker, you'll develop financial models, analyze market trends, and provide strategic recommendations for mergers, acquisitions, and other financial transactions.
- **Actuary:** Assess and mitigate risks in insurance, finance, and lending institutions using mathematical models. Actuaries play a crucial role in predicting future events and making informed decisions to safeguard against uncertainties.

# FACT-O-MANIA



**1** There is exactly one set of prime number triplets,  $N$ ,  $N+2$ ,  $N+4$ , where  $N$  is a prime number: (3,5,7).

**2** FOUR is the only number which has the same number of alphabets in its spelling as the value of the digit i.e. F-O-U-R.

**3** If you shuffle a deck of cards properly, it's more than likely that the exact order of the cards you get has never been seen before in the whole history of the universe.

**4** A 'jiffy' is an actual unit of time. It means  $1/100$ th of a second.

**5** The symbol for division (i.e.  $\div$ ) is called an obelus.

**6** If you started with ₹1 and doubled its value every day for just 30 days, on the 30th day you would have ₹53,68,70,912 i.e. fifty three crore sixty eight lakh seventy thousand nine hundred twelve rupees.

**7** The reason Americans call mathematics "math", is because they argue that "mathematics" functions are singular nouns so 'math' should be singular too.

**8** Zero is not represented in Roman numerals.



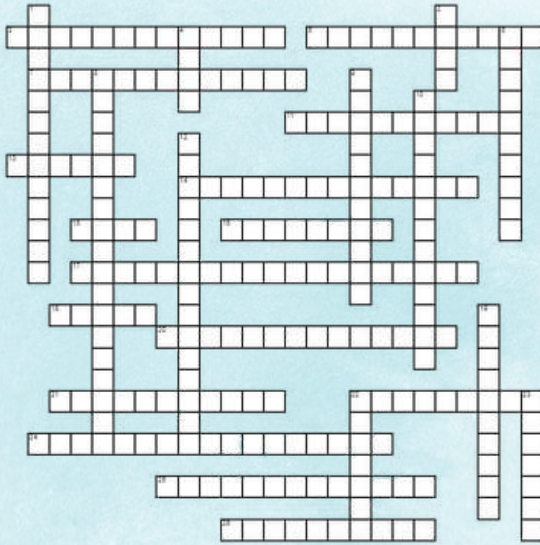
# MATH MANIA



## The Ultimate Math Challenge Game

### Crossword Fun

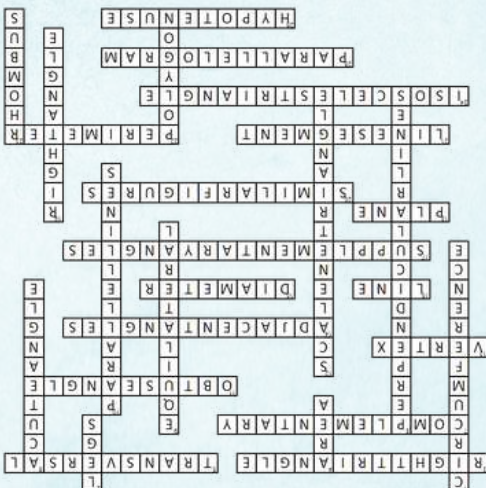
Challenge yourself with Words and Clues



#### Across

- 3 Triangle with one right angle
- 5 Line that cuts across parallel lines
- 7 Angles whose sum is 90
- 11 An angle that measures more than 90 and less than 180
- 13 The point where two sides of an angle meet
- 14 Angles that share one side
- 15 Straight path of points that continues in two opposite directions
- 16 Distance across and through the center of a circle
- 17 Angles whose sum is 180
- 18 A flat surface
- 20 Figures with the same shape but not necessarily the same size
- 21 Straight path of points with definite length, having two endpoints
- 22 Distance around a closed plane figure
- 24 A triangle in which two sides have the same length
- 25 A four-sided figure with two pairs of parallel sides
- 26 In a right triangle, the side opposite to the right angle

#### Answer



### Riddles

1. If there are four apples and you take away three, how many do you have?
2. What can you put between a seven and an eight so that the result is greater than a seven but less than an eight?
3. What's the maximum number of times you can subtract five from 25?
4. There are 100 pairs of dogs in a zoo; a pair of babies are born for each dog. Unfortunately, 23 of the dogs have not survived. How many dogs are left in total?

#### Down

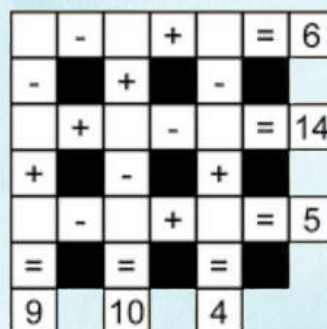
- 1 Distance around a circle
- 2 The two shorter sides in a right triangle
- 4 Length x width
- 6 Angle measuring less than 90
- 8 Lines that intersect at a right angle
- 9 Equal sides and equal angles
- 10 Lines that run in the same direction and do not cross
- 12 Triangle with no equal sides
- 19 Angle that measures exactly 90
- 22 Closed plane figure formed by three or more line segments
- 23 Four-sided figure with four equal sides

#### Riddle Answers

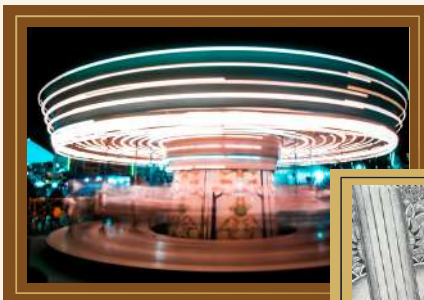
1. 3 apples 2. A decimal 3. Only once 4. 977

### Math Madness

- Can you fit the right numbers?
- Guess the missing number



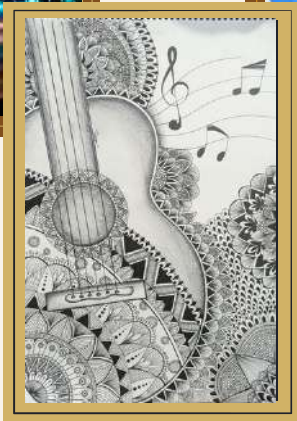
# Kalakari



**VISHWESH TIWARI  
SHIVAJI COLLEGE**



**SNEHA GUPTA  
SHIVAJI COLLEGE**



**TANYA  
SHIVAJI COLLEGE**



**MUNISH GAKHAR  
KIRORI MAL COLLEGE**

## NUMERICAL SYMPHONY: A JOYOUS ODE TO MATHEMATICS

IN THE VAST EXPANSE WHERE NUMBERS REIGN,  
MATHEMATICS DANCES, A JOYOUS REFRAIN.  
FROM THE TINIEST ATOMS TO GALAXIES AFAR,  
NUMBERS WEAVE TALES, BOTH NEAR AND FAR.

LET'S EMBARK ON A JOURNEY, A MATHEMATICAL RIDE,  
WHERE LAUGHTER AND LEARNING WALK SIDE BY SIDE.  
IN THIS REALM OF EQUATIONS, PUZZLES, AND FUN,  
WE'LL EXPLORE THE WONDERS UNTIL WE'RE DONE.

IMAGINE A WORLD WHERE PI'S A PLAYFUL FRIEND,  
WITH DIGITS STRETCHING BEYOND THE END.  
WE'LL BAKE CIRCLES OF INFINITE DELIGHT,  
IN THE OVEN OF MATH, EVERY SLICE IS RIGHT.

FROM COUNTING STARS TO MEASURING TIME,  
MATHEMATICS SINGS, A MELODIOUS CHIME.  
GEOMETRY PAINTS LANDSCAPES, SHAPES IN FLIGHT,  
WITH ANGLES AND LINES, A SYMPHONY OF LIGHT.

ALGEBRA'S PLAYGROUND, WITH X'S AND Y'S,  
WE SOLVE FOR THE UNKNOWN, REACHING THE SKIES.  
POLYNOMIALS DANCE, QUADRATIC DREAMS,  
IN THIS ALGEBRAIC WONDERLAND, NOTHING'S AS IT SEEMS.

CALCULUS WHISPERS SECRETS, SLOPES ON A SPREE,  
WITH DERIVATIVES AND INTEGRALS, WE SET EQUATIONS FREE.  
LIMITS AND FUNCTIONS, CURVES THAT SOAR,  
IN THE CALCULUS OF JOY, WE SEEK FOR MORE.

STATISTICS PAINTS PATTERNS, PROBABILITIES AT PLAY,  
IN THE WORLD OF DATA, WE FIND OUR WAY.  
FROM ROLLING DICE TO FLIPPING COINS,  
MATHEMATICS UNLOCKS THE WORLD'S JOINS.

IN EVERY PROBLEM, A PUZZLE TO SOLVE,  
WITH CREATIVITY AND LOGIC, WE EVOLVE.  
FOR MATH IS NOT JUST NUMBERS ON A PAGE,  
IT'S A JOURNEY OF DISCOVERY, FROM AGE TO AGE.

SO LET'S CELEBRATE THIS MATHEMATICAL DELIGHT,  
IN THE DAY AND THE NIGHT, IN THE SUN AND THE LIGHT.  
FOR IN THE REALM OF MATH, BIG AND GRAND,  
FUN AWAITS AT EVERY HAND.

**- PRACHI  
SHIVAJI COLLEGE**

## THE NUMBER LINE

THE INTEGERS LINE IN  
WITH SOME GAP,  
THE RATIONAL, IRRATIONALS DENSELY PACKED,  
THE TUNING OF EVEN AND ODD  
BACK TO BACK BREAKS THE  
MONOTONY OF NUMBERS AHEAD!

THE DANCE OF FIBONACCI SEQUENCE  
ASTONISHES A LOT AS IT  
FITS IN PATTERN OF NATURE A LOT  
WHERE WE FIND THE BEAUTY A LOT  
NATURE USES THE GOLDEN RATIOS IN SHORT

THE X AND Y AXES WEAVES A MESH  
PRODUCING A PLANE FOR TAPESTRY OF CURVES  
CURVES TEACH US TO BE SMOOTH AND NICE  
SO THAT YOU CAN HOLD THE TANGENTIAL STRESS FINE

IDENTITY IN GROUP AND FIELD  
ROARS THE NOTION OF UNIQUENESS WITH NOD.  
BE CLOSE WITH OUR NEIGHBOURS  
AS EPSILON-DELTA WITH NUMBERS  
AS SEQUENCES AND SERIES CONVERGE  
MAY GOD OUR GOALS ALSO CONVERGE

THE SAGA OF NUMBERS NEVER ENDS  
TIRED THEY USED INFINITY( $\infty$ ) WITH SHORTHAND

**- PRABHAT RASTOGI  
SHIVAJI COLLEGE**

# LET'S HEAR FROM OUR SENIORS!

As I reflect on my time as the President of Tesseract - the Mathematics Society at Shivaji College, I am filled with an overwhelming sense of gratitude for the countless memories and experiences that have shaped me. If I were to recall one of the core memories of my college, which actually passed in blink of an eye, it would be definitely the time I have spent with my friends in this society. I didn't have "juniors", but they were more of my friends and indeed it was their support along with my core friends who made Tesseract a big success, a society to be known for amazing events or in fact, Goa trip. Things do not always go as planned, some events could have gone downhill due to numerous reasons, be it a lack of support from teacher in-charge or lack of funds, but the members of Tesseract always made sure that every event is bang on to the upfront. Nevertheless, I will always be thankful to the teachers who supported us, the society or even the cause. with their blessings. It was their firm support which held the society upright. Being a part of this society since my first year of college helps me to boil down the journey of Tesseract in one word and that is "Progressive". I would be lying if I say that Tesseract was always this big, but I have seen it growing with immense hard work and dedication of its members. I still remember how much our society got recognized among other societies by the time I was about to bid farewell to the beautiful college journey but what makes me much happier is the legacy being followed, how much the current council is dedicated to make it a better version. Kudos to the core team, all supporting members and in fact, each ex-member who have been a part of this Tesseract journey. Tesseract has given the best memories of my college life, the memories which I will always be holding onto. Congratulations to the current council for new edition of this newsletter.



Mohan Kaushik



Sanskriti

I was very skeptical about my college being any good as it started during the pandemic but may be the online classes were the very reason I connected with so many people without hesitating much. Mathematics dept. at Shivaji college gave me plenty of opportunities to explore myself. Keeping aside the academic part, to me the best part of this 3 years short journey were the people I met. I made some amazing friends whom I can trust with anything they encouraged me, pushed me out of my comfort zone, made me try new things and gave me so many memories to cherish. Tesseract connected me with the juniors who were more than just juniors they became essential part of our class bunk, companions to our nowhere trips and made stressful fest days a lot better. Though my college life was not even close to what is shown in Karan Johar movies but a better version of my own story.

I became a part of Tesseract at the very start of my college life; I wouldn't lie, it was tough at times, in the first few months I even regretted joining it, but in no time, it became one of the biggest joys of my college life! The confidence I gained, through the laurels of my peers, and teachers; the skills I honed, the fussy yet funny days, are all priceless. Moreover, the friendships forged within Tesseract are a treasure beyond measure! Becoming a part of a society like Tesseract not only provides opportunities for personal growth and skill development but also fosters a sense of community and belonging. I greatly admire my juniors, who have only taken the society to further heights. They have always been ready to take things head-on and succeed at it! Be it organizing an international conference, winning competitions in another state, or organizing fun-filled events. Tesseract continues to excel through its members. The memories, skills, and friendships forged through Tesseract will undoubtedly leave a lasting impact on your life beyond college. I wouldn't trade my experience as a member of Tesseract for anything!



Shruti



Chetna

Attending Shivaji College has been an incredible journey filled with irreplaceable experiences and opportunities for personal and academic growth. The faculty's dedication to excellence, combined with a vibrant campus community, fostered an environment where I was able to thrive both academically and socially. From innovative courses to supportive mentorship, I am grateful for the skills and knowledge I've gained during my time here. Serving as a Head of various college societies and specifically TESSERACT truly prepared me for success in both my career and life beyond the classroom.

The Department of Mathematics at Shivaji College provides a conducive learning environment. The professors here are not just dedicated experts but also genuinely caring, making learning enjoyable. Joining Tesseract - The Mathematics Society was one of the best decisions I made. Managing the technical team and hosting competitions for the Mathematics Fest was an enriching experience that provided me with an intellectual and creative peer group, making college interesting.



Kashika



Khushbu

The memories made within the boundaries of Shivaji college fills my heart with immense gratitude. Though the college started in an online mode, but the mathematics department here left no stone unturned to nurture the students and help them in every way possible. Joining Tesseract was one of the best decisions of mine, I learnt so many new things, met amazing people, connected with people from other colleges as well, and most importantly worked with a wonderful team. This 3 years journey was nothing less than a roller coaster, there were ups and downs, but my downs were always accompanied by the people whom I now call my dear friends. The faculty here at our department is one of the best, they all are so supportive, kind and full of love for students. I had the best 3 years of my life here being part of math department at Shivaji College and will continue to cherish the memories I made here.