

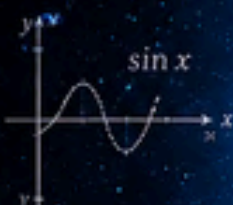
FUSION OF ARTIFICIAL INTELLIGENCE AND HUMAN INTELLIGENCE
— USING MATHEMATICS —

CONTINUUM 3.0

VOL. 3
ANNUAL MAGAZINE

MATHEMATICS
DEPARTMENT

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$



$$\int_a^b f(x) dx$$

$$\lim_{x \rightarrow \infty} \frac{\sin x}{x} = 1$$

$$a^2 + b^2 = c^2$$



$$f(x) = ax^2 + bx + c$$

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

$$\frac{d^2 y}{dx^2} + ky = 0$$



$$\nabla \cdot E = \frac{\rho}{\epsilon_0}$$

$$E = mc^2$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\nabla^2 \psi + \frac{2m}{\hbar^2} (E - V) \psi = 0$$



$$\phi = \frac{1 + \sqrt{5}}{2}$$



THE EXPONENTS

DEPARTMENT OF MATHEMATICS
BHARATI COLLEGE
UNIVERSITY OF DELHI

$$\int_a^b f(x) dx$$

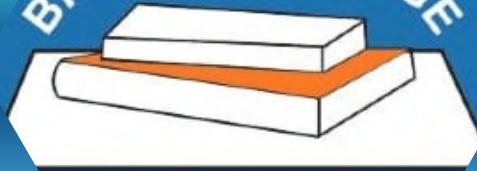
MATHEMATICS : THE LANGUAGE OF THE UNIVERSE

$$\frac{d}{dx} \ln x = \frac{1}{x}$$

USING MATHEMATICS



भारती कॉलेज
BHARATI COLLEGE



न हि ज्ञानेन सदृशं
पवित्रमिह विद्यते।



FROM THE DESK OF

PRINCIPAL



PROF. DR. SALONI GUPTA

Dear Students and Faculty Members,
It brings me great pleasure to congratulate you on the inaugural issue of our Mathematics department magazine. As we start on this exciting journey together, I am filled with optimism and enthusiasm for the boundless possibilities that lie ahead. I encourage each of you to embrace the challenge of diving deep into the world of numbers and equations. Let us approach mathematics not as a daunting task but as a captivating adventure, one that stimulates our brains and keeps them fertile with new ideas and insights. Mathematics is not just an academic pursuit; it is a mental workout that enhances cognitive abilities and fosters critical thinking skills.

As members of this esteemed department, we bear a special responsibility to not only hone our own quantitative aptitude but also to extend a helping hand to others in developing theirs. Let us embody the spirit of collaboration and mentorship, creating an environment where every student feels empowered to excel in mathematics. Whether through peer tutoring, study groups, or organized workshops, let us cultivate a culture of mutual support and encouragement. As we start on this journey together, I am confident that our dedication to the beauty of numbers will allow our minds to soar to new heights of understanding and creativity. Let us embrace this journey with open hearts and eager minds, knowing that the possibilities are limitless and the rewards immeasurable. I extend my heartfelt gratitude to all who have contributed to the creation of this magazine and look forward to witnessing the continued growth and success of our Mathematics department.

FROM THE DESK OF

TEACHER - IN - CHARGE DR. SARITA KADIAN



It gives me great pride and genuine fulfilment to share a few thoughts for this year's edition of our departmental magazine, 'CONTINUUM 3.0'. The publication serves as a complete showcase of our Mathematics Department's intellectual capabilities, creative talents and collaborative teamwork. The space functions as a research centre that allows inquisitive students to express themselves through various educational activities while they develop their personal interests and present their work.

The Mathematics Department creates an environment that honours its members by serving as a platform for their dedication to a field that develops logical thinking, motivates creative work, and leads to scientific progress. Mathematics exists as a complete discipline that uses numbers and formulas to create a structured mental approach that enables people to think clearly through problems and find solutions. The annual magazine requires you to write about your academic experiences while showing how mathematical thinking shapes your understanding of the world. The path to understanding requires you to develop curiosity about things and see difficulties as opportunities while you work through complex problems. Your platform serves as a space where you can share your ideas and creative work while you develop your intellectual abilities with confidence and academic precision.

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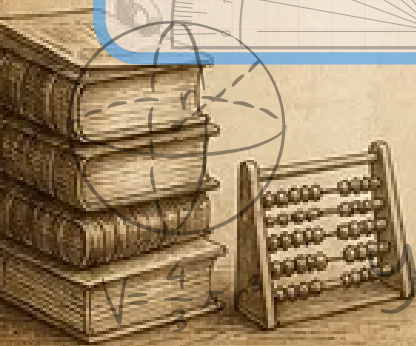
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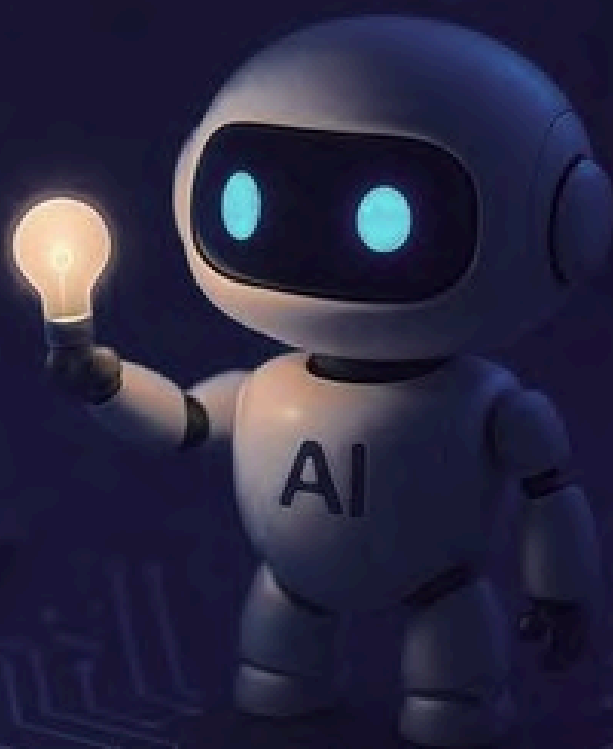
$$y - y_1 = m(x - x_1)$$



$$V = Lwh$$

SECTION 1

Roots & Resonance



With a heritage of more than half a century, Bharati College boasts a wide range of undergraduate and postgraduate courses in the arts, commerce, and science streams.

From the classroom to the national-level conference, from cultural celebrations to outreach programs in the community, this college challenges its students to participate, to lead, and to rise. It is an institution where opportunity and aspiration converge and where women become graduates ready to change the world—not only as graduates, but as changemakers.



THE EXPONENTS

DEPARTMENT OF MATHEMATICS
BHARATI COLLEGE



In the constantly changing academic landscape of Bharati College, The Exponents is a strong symbol of passion, development, and mathematical curiosity. Established in August 2017 by the Department of Mathematics, this society was born with a mission: to unveil students to the beautiful and rich world of mathematical sciences and to create a community where intellect and innovation go hand in hand.

Since its foundation, The Exponents has remained committed to the overall growth of students. Far more than an arena for scholastic enhancement, it cultivates leadership, confidence, and teamwork through a plethora of enriching activities. Right from arranging seminars and workshops to introducing niche initiatives such as Vedic Math classes and ASC (Aptitude Skill Coaching) for aspirants of government exams, the society makes sure that mathematics becomes not just comprehensible, but immensely empowering.

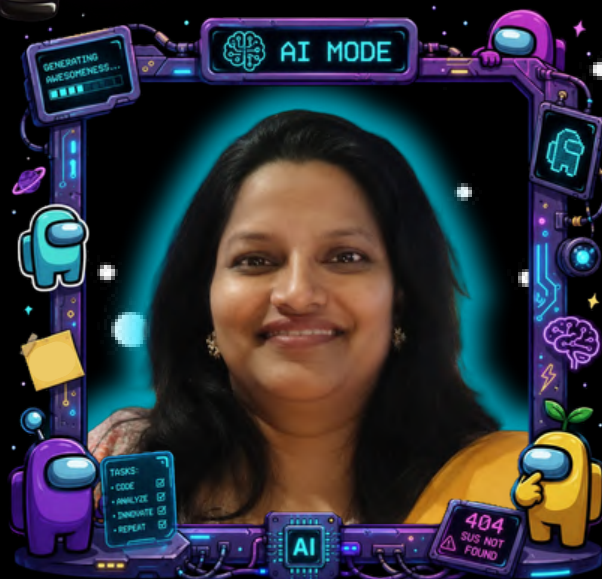
One of the highlights of the society is its annual event, named Xponentia this year—an intellectual celebration of talent and collaboration. Much more than the pages of textbooks, Xponentia provides students with a platform to venture into debates, games, creative competitions, and moments of togetherness that remain with them well after the event is over.

Through the years, The Exponents has become a center of learning, mentorship, and inspiration. It is not only a shaper of mathematical minds but also of well-rounded individuals who are ready to face the future with clarity and conviction.





FACULTY MEMBERS



ANUBHA BHARGAVA

Convener



DR. ANKIT GUPTA

Co-convener

UNION MEMBERS



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EXECUTIVE BOARD



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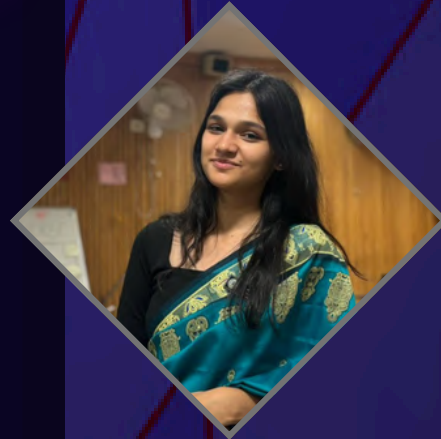


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GRAPHIC TEAM



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CONTENT TEAM



ADITY KANWAR



BHUMIKA

RESEARCH TEAM



SHALINA



NIDHI YADAV

THE EMERGING MINDS

(The 1st YEAR's)



MIDWAY MAVERICKS

(The 2nd year's)



THE FINAL BOSSES

(The 3rd year's)



THE MAIN CAST

(The 4th year's)



SECTION : 2

MATHEMATICS THROUGH TIME

Mathematics has always been a part of human life, often in ways we don't even notice. From counting and measuring in ancient times to powering modern technologies like artificial intelligence, it has quietly shaped the way we understand and interact with the world.

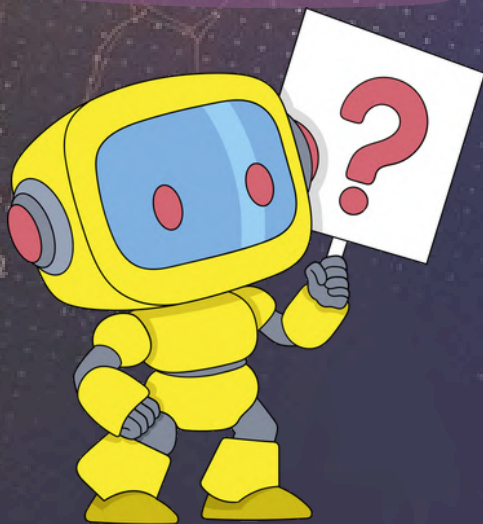
$$f(x) = ax^2 + bx + c$$

$$\sum_{k=1}^n k = \frac{n(n+1)}{2}$$

$$\int_a^b f(x) dx$$

```
algorithm  
while (n > 0) {  
    n = n / 2;  
    count++;  
}
```

What makes mathematics truly fascinating is not just its ability to provide answers, but its continuous journey of growth and discovery. As human thinking evolved, so did mathematics—adapting, expanding, and finding new ways to solve increasingly complex problems.



This section explores that journey, tracing how mathematics developed over time and how it continues to influence the world around us today.

EVOLUTION OF MATHEMATICS: FROM ABACUS TO ALGORITHMS

Mathematics did not begin as a subject written in textbooks; it started as a basic human need. In early civilizations, people needed ways to count goods, measure land, and keep track of trade. These everyday challenges led to the birth of mathematical thinking. One of the earliest tools developed for this purpose was the abacus, a simple yet powerful device that made calculations faster and more reliable.

As daily life became more complex, people across different regions began developing their own ways to handle numbers and solve practical problems. In places like Mesopotamia, Egypt, India, and China, counting gradually became more organized and systematic. What started as simple methods slowly turned into structured systems of numbers and calculations. Mathematics was no longer just about counting—it started becoming a way to understand patterns and bring order to the world.

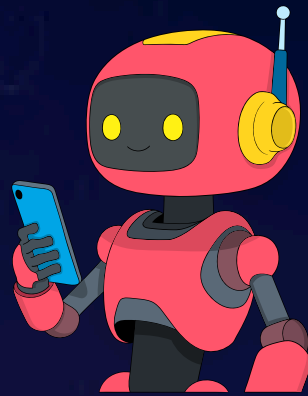
A major shift came with Greek mathematicians, who introduced logic, reasoning, and proof into mathematics. Instead of just finding answers, they focused on explaining why those answers were true. This approach laid the foundation for modern mathematics. The work of Euclid, especially his famous book *Elements*, became a cornerstone for proof-based mathematical thinking and continues to influence the subject even today.

Over time, mathematics moved beyond simple calculations to more structured, step-by-step problem-solving methods known as algorithms. An algorithm is a process used to solve a problem within a finite number of steps. The term itself is derived from the name of the mathematician Muhammad ibn Musa al-Khwarizmi, whose work played a crucial role in developing arithmetic methods. Even Euclid's method for finding the greatest common divisor is considered one of the earliest examples of an algorithm.

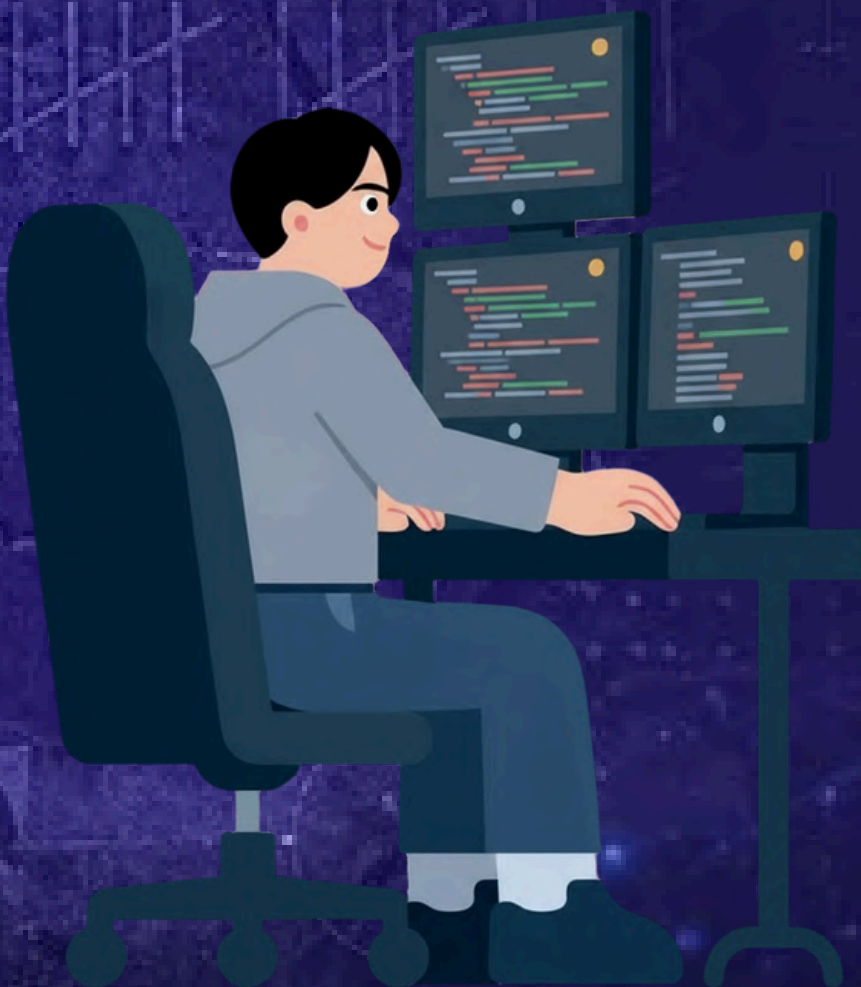
In today's world, algorithms are at the heart of modern technology. From navigation systems and online shopping to many other everyday digital activities, they play a key role in making processes faster and more efficient. More importantly, algorithms form the backbone of artificial intelligence, where machines are trained to think, learn, and make decisions.



This mathematical power goes beyond everyday digital platforms and plays a crucial role in systems we rely on daily. One of the most important applications of these algorithms can be seen in digital transactions. Every time we make a payment, whether through UPI or online banking, a series of algorithms work instantly in the background. When a user enters a PIN, it is protected using encryption, which simply means converting information into a secure code so that it cannot be misused. Within seconds, the system verifies details, checks balances, and completes the transaction safely. What feels like a simple tap on a screen is actually a result of precise mathematical logic working silently behind the scenes.



The journey of mathematics—from the abacus to advanced algorithms—reflects the growth of human intelligence over time. What once required manual effort is now performed instantly by machines. Yet, behind every intelligent system lies the same mathematical thinking developed by humans centuries ago. This evolution beautifully highlights the connection between human intelligence and artificial intelligence, showing how the past continues to shape the future.



BRANCHES OF MATHEMATICS AND ITS FUSION WITH AI

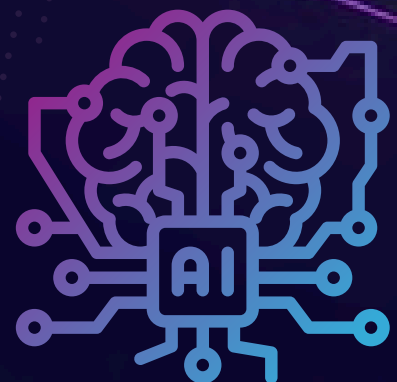


Mathematics is often seen as a single subject but in reality, it is a collection of different branches, each designed to solve a specific kind of problem. From basic calculations to complex decision-making systems, these branches together form the backbone of modern technology.

At the most fundamental level, arithmetic deals with numbers and basic operations that we use in everyday life. Building on this, algebra introduces symbols and equations, helping us represent relationships and unknown values. Geometry focuses on shapes, space, and measurement, playing an important role in areas like computer graphics and design.

As problems became more dynamic, calculus was developed to study change, motion, and rates. It allows systems to continuously adjust and improve. Alongside this, probability and statistics help us understand data, uncertainty, and patterns—something that has become extremely important in today's data-driven world. Discrete mathematics, which deals with logic, graphs, and structured steps, forms the basis of algorithms and programming.

In today's world, these branches come together to power artificial intelligence. To understand how these branches work together in real life, we can look at modern navigation system



REAL-LIFE APPLICATION: NAVIGATION SYSTEMS

One of the best examples of how different branches of mathematics work together can be seen in navigation applications like Google Maps. When a user searches for a route, the system performs multiple calculations in the background.

Concepts from Graph Theory are used to represent roads as a network of connected points, allowing the system to determine possible paths. At the same time, ideas from Calculus help in selecting the most efficient route by minimizing travel time and distance.

At the same time, artificial intelligence is also influencing mathematics. It helps researchers identify patterns faster, test complex problems, and explore new possibilities that were once difficult to handle manually.

This shows that mathematics and AI are deeply interconnected. Mathematics provides the structure and logic, while AI applies it in real-world situations. Together, they are not only transforming technology but also reshaping how we understand and use mathematical thinking in everyday life.

In addition, Probability Theory is used to analyze traffic patterns and predict delays based on past data. This enables the system to provide accurate and real-time navigation.

What appears to be a simple direction on a screen is actually the result of multiple mathematical concepts working together with artificial intelligence to solve real-world problems efficiently.



WOMEN IN MATHEMATICS

$$\int_a^b f(x)dx = F(b) - F(a)$$

Mathematics has never been limited by gender, yet history often limited the recognition given to those who contributed to it. Many women made remarkable contributions to mathematics despite facing social and academic barriers. Their work not only shaped mathematics but also laid the foundation for modern science and technology.

One of the most inspiring figures is Emmy Noether, widely regarded as one of the greatest mathematicians of the modern era. At a time when women were not even allowed equal access to universities, she pursued mathematics with determination. She often worked without pay and struggled for recognition in academic circles. Despite these challenges, her work transformed the field of abstract algebra. Her most famous contribution, known as Noether's theorem, established a deep connection between symmetry and conservation laws in physics. This idea remains fundamental in modern physics and has applications in advanced scientific research and even in areas connected to artificial intelligence.

Another pioneering figure is Ada Lovelace, who is often called the world's first computer programmer. She worked with Charles Babbage on the design of the Analytical Engine, an early mechanical computer. What made her vision extraordinary was her understanding that machines could do more than just calculate numbers—they could follow instructions and process symbols. This idea forms the very basis of modern programming and artificial intelligence today.



These women proved that mathematical ability is not defined by gender, but by curiosity, logic, and creativity. However, their journeys also remind us of the challenges women faced in gaining recognition for their work.

Today, as we see rapid growth in artificial intelligence and technology, the contributions of women in mathematics continue to inspire future generations. Their legacy encourages us to build a more inclusive environment where talent is recognized equally, and innovation is driven by diversity of thought.

ABEL'S PRIZE

In the world of mathematics, where discoveries often remain hidden behind complex symbols and theories, the Abel Prize stands as a powerful recognition of human brilliance. It is one of the most prestigious international awards in mathematics, created to honor extraordinary contributions that shape the future of the field.

The prize is named after Niels Henrik Abel, whose work laid important foundations in mathematical analysis despite his short life. Established by the Norwegian government and awarded by the Norwegian Academy of Science and Letters, the Abel Prize is often compared to the Nobel Prize, as there is no Nobel Prize specifically dedicated to mathematics.

Each year, the award is given to one or more mathematicians whose work has had a deep and lasting impact. Some of its notable recipients include Andrew Wiles, known for solving Fermat's Last Theorem, John Nash, whose ideas transformed game theory, Karen Uhlenbeck, a pioneer in geometric analysis, and László Lovász, known for his contributions to combinatorics and theoretical computer science.

More than just an award, the Abel Prize highlights the importance of pure mathematics and its long-term influence on science, technology, and society. It reminds us that behind every technological advancement—including artificial intelligence—there are years of deep mathematical thinking and human effort.

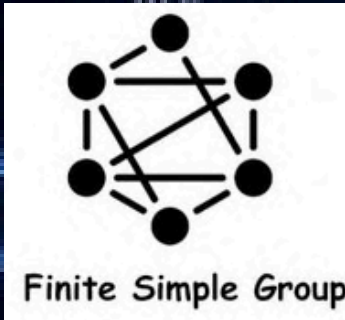


WHY IT MATTERS???

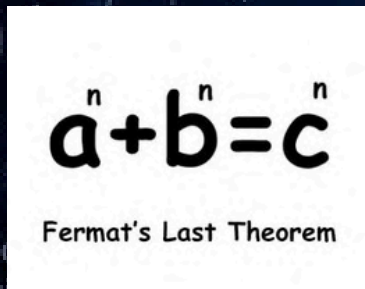
The Abel Prize plays a significant role in bringing mathematics into the public spotlight. It shows that mathematics is not limited to classroom calculations but is a field of creativity, exploration, and discovery.

It also serves as an inspiration for students and young minds. By celebrating the achievements of mathematicians, it encourages curiosity, persistence, and the courage to solve challenging problems. In a world increasingly shaped by technology and AI, such recognition reminds us that human intelligence remains at the heart of innovation.

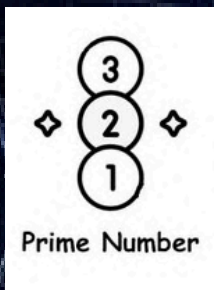
MATHEMATICAL THEORIES THAT REMAINS UNSOLVE



Mathematics is often seen as a subject of certainty, where every problem has a clear answer. However, this is not entirely true. Even today, mathematics contains many deep and fascinating questions that remain unsolved. Some of these problems are surprisingly simple to understand, yet incredibly difficult to prove.



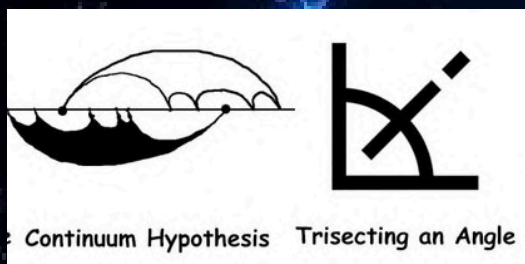
A major turning point in understanding the limits of mathematics came from the work of Kurt Gödel. Through his famous Gödel's incompleteness theorems, he showed that within any logical system, there exist statements that can neither be proved nor disproved. This challenged the idea that mathematics can explain everything.



Similarly, Alan Turing introduced the concept of the Halting Problem, proving that there is no universal method to determine whether every algorithm will eventually stop or run forever. This result revealed fundamental limits of computation and has deep implications for computer science and artificial intelligence.



Beyond these theoretical limits, there are also famous unsolved problems that continue to challenge mathematicians across generations. One such example is the Riemann Hypothesis, which is related to the pattern of prime numbers and remains one of the most important open questions in mathematics. Another is the P versus NP problem, which asks whether problems that can be verified quickly can also be solved quickly—an issue that directly affects cryptography, algorithms, and modern computing.



These unsolved problems are not weaknesses of mathematics; rather, they are its driving force. They push researchers to develop new methods, explore deeper theories, and expand human understanding. In fact, many breakthroughs in science and technology have emerged while attempting to solve such questions.

Mathematics, therefore, is not a finished subject. It is constantly evolving—questioning, exploring, and discovering. The presence of unsolved problems makes it more dynamic, meaningful, and exciting, reminding us that there is always more to learn.

CONCLUSION

Mathematics, through time, reflects the growth of human intelligence—from simple ideas to complex systems that now power technologies like artificial intelligence. Its journey is shaped by discovery, creativity, and the continuous effort to understand the world more deeply.

Today, the connection between mathematics and AI shows how human thinking can extend beyond its limits. While mathematics provides the logic and structure, artificial intelligence applies it to solve real-world problems in faster and smarter ways.

At the same time, unanswered questions and ongoing research remind us that mathematics is still evolving. It is not just about solutions, but about exploration and possibility—continuously shaping both human understanding and the future of innovation.



SECTION-3

MATHEMATICS

MEETS

ARTIFICIAL

INTELLIGENCE

Infinity exists
everywhere. My jujutsu
just brings it forward in
reality



π "WHERE NUMBERS CREATE INTELLIGENCE"

Artificial Intelligence (AI) has emerged as one of the most influential technologies of the 21st century, transforming industries, education, and everyday life. AI is changing the world around us—from smartphones to self-driving cars. But behind this powerful technology lies a strong foundation: Mathematics. Artificial Intelligence has become one of the most transformative innovations of the modern world, influencing the way people live, work, and communicate. From unlocking mobile phones using facial recognition to receiving personalized suggestions on shopping and entertainment platforms, AI has seamlessly integrated into daily life. However, behind this advanced technology lies a powerful and often overlooked foundation—mathematics.

Mathematics is not just about numbers and formulas; it is the language that enables machines to think, learn, and make decisions. It provides structure, precision, and logical reasoning, all of which are essential for building intelligent systems. This connection between mathematics and artificial intelligence is what allows machines to analyze large amounts of data, identify patterns, and continuously improve their performance. As we move towards a more technology-driven future, understanding the role of mathematics in AI becomes increasingly important, as it forms the core of innovations that are shaping the world around us. Without mathematics, AI would not be able to learn from data or improve over time. The relationship between mathematics and AI is therefore deeply interconnected, making mathematics the backbone of all intelligent systems.



Mathematics Behind Artificial Intelligence

Artificial Intelligence refers to machines that can perform tasks requiring human intelligence, such as learning, reasoning, and problem-solving. It simulates human intelligence by performing tasks such as learning, reasoning, problem-solving, and decision-making. Unlike traditional programming, where machines follow fixed instructions, AI systems are designed to learn from data and improve over time. This learning process is entirely dependent on mathematics, which provides the tools needed to analyze data and build intelligent models.

Calculus plays an equally important role by helping AI models learn and improve. It is used to understand changes and optimize models so that they can perform better with each iteration. It is used to measure how changes in input affect the output and to optimize models for better performance. Techniques like gradient descent allow AI systems to reduce errors and continuously improve their accuracy. Probability and statistics allow AI systems to deal with uncertainty, make predictions, and draw conclusions from incomplete information.

Together, these mathematical concepts form the backbone of AI, enabling machines to transform raw data into meaningful insights. Without mathematics, AI would not be capable of learning or adapting, making it an essential component of every intelligent system.

Mathematics acts as the core language of AI. Without mathematics, AI cannot function. It provides the logic, structure, and formulas that allow machines to process data and improve over time.

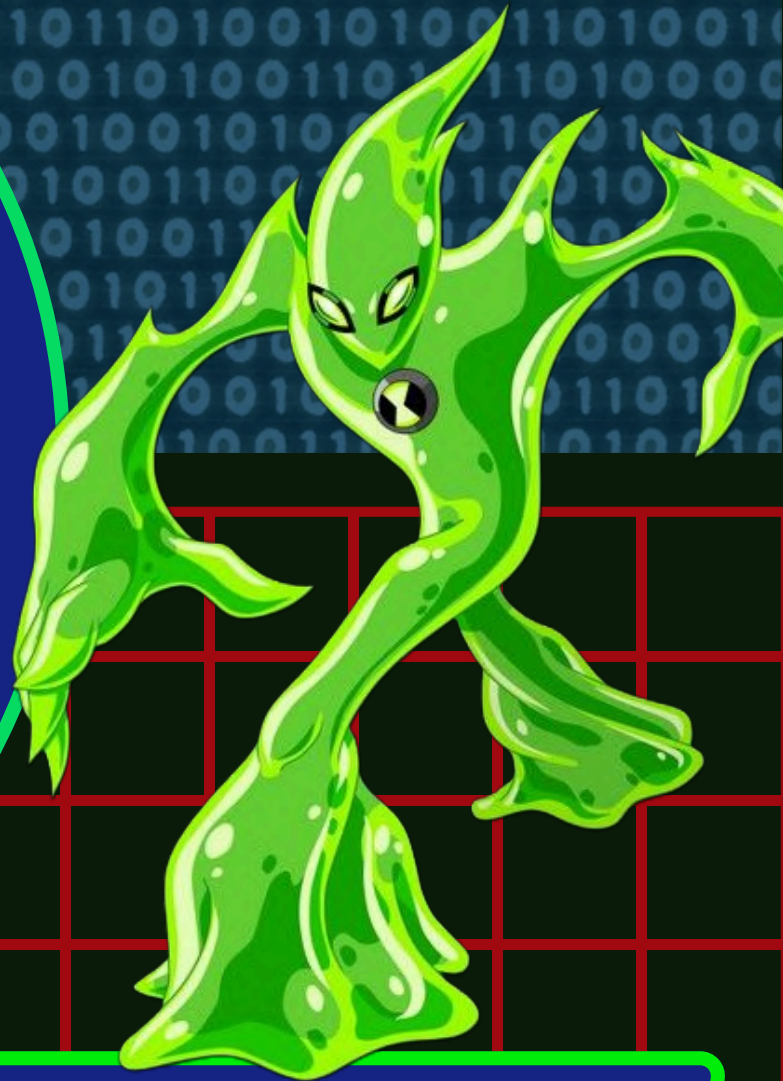
The functioning of artificial intelligence is rooted in several key areas of mathematics, primarily linear algebra, which helps represent data in the form of vectors and matrices, making it easier to process large datasets efficiently. For instance, images, text, and audio are converted into numerical values so that machines can analyze them. This mathematical representation enables systems to recognize patterns, such as identifying objects in images or understanding speech.



LINEAR ALGEBRA IN AI

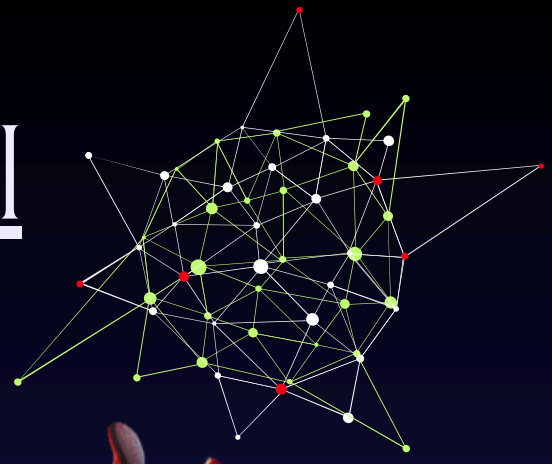


Linear Algebra is used to handle data in the form of vectors and matrices. It plays a crucial role in artificial intelligence by providing a systematic way to represent and manipulate data. In AI systems, information such as images, text, and audio is converted into numerical form, often represented as vectors and matrices. This transformation allows machines to process complex data efficiently and perform operations at a large scale. For example, an image can be viewed as a grid of pixel values, where each value represents a specific color intensity.



Linear Algebra is used to handle data in the form of vectors and matrices. It plays a crucial role in artificial intelligence by providing a systematic way to represent and manipulate data. In AI systems, information such as images, text, and audio is converted into numerical form, often represented as vectors and matrices. This transformation allows machines to process complex data efficiently and perform operations at a large scale. For example, an image can be viewed as a grid of pixel values, where each value represents a specific color intensity.

CALCULUS IN AI



Calculus helps AI systems learn and improve. It is another fundamental branch of mathematics that plays a vital role in artificial intelligence, particularly in the process of learning and optimization. It focuses on understanding how quantities change and how to find the best possible solutions to problems.

In AI, calculus is used to measure how changes in input variables affect the output of a model, which is essential for improving its accuracy. One of the most important applications of calculus in AI is the concept of gradient descent, an optimization technique used to minimize errors in predictions. By continuously adjusting the parameters of a model, gradient descent helps the system move closer to the most accurate result.

Neural networks, which are widely used in deep learning, consist of multiple layers of interconnected functions. Calculus helps in analyzing these functions and determining how to update them to achieve better performance. Through this process, AI systems are able to learn from their mistakes and refine their predictions, making calculus an essential component of intelligent learning systems.

PROBABILITY & STATISTICS

Probability helps AI deal with uncertainty and incomplete data. Probability and statistics are essential in artificial intelligence because they allow systems to handle uncertainty and make informed decisions based on data. In real-world scenarios, data is rarely perfect; it may be incomplete, noisy, or unpredictable. Probability provides a framework for estimating the likelihood of different outcomes, enabling AI systems to make predictions even when the information is uncertain. For instance, an AI model can predict the chances of a particular event occurring, such as detecting whether an email is spam or not. Statistics, on the other hand, helps in analyzing and interpreting data by identifying patterns and trends. It allows AI systems to summarize large datasets and evaluate the performance of models.



MATHEMATICS IN REAL LIFE WITH AI

Artificial intelligence, supported by mathematical concepts, has found applications in numerous real-life fields, significantly improving efficiency and accuracy. In healthcare, AI systems assist doctors by analyzing medical images such as X-rays and MRIs to detect diseases at an early stage. These systems can identify abnormalities like tumors or fractures with remarkable precision, helping in faster diagnosis and better treatment.

In the financial sector, AI is used for credit scoring and fraud detection, where mathematical models analyze customer data to assess risks and prevent fraudulent activities. In manufacturing, AI plays a crucial role in predictive maintenance by monitoring machines and predicting potential failures before they occur, thereby reducing downtime and increasing productivity. These examples highlight how mathematics-driven AI is transforming industries by solving complex problems and enhancing decision-making processes, making it an integral part of modern society.

AI in real-world areas:

- **Healthcare**

- Detecting diseases using X-rays and scans.

- **Finance**

- Credit scoring and fraud detection.

- **Manufacturing**

- Predictive maintenance to avoid machine failure.

- These applications show how mathematics helps AI solve real problems.

AUTONOMOUS SYSTEMS

Autonomous systems represent one of the most advanced applications of artificial intelligence, where machines are capable of operating independently without human intervention. Examples of such systems include self-driving cars, drones, and robots, all of which rely heavily on mathematical models and algorithms. These systems use sensors to collect data from their environment, such as detecting obstacles, measuring distances, and identifying objects. The collected data is then processed using mathematical techniques to make real-time decisions.



For instance, a self-driving car uses algorithms to calculate the safest route, adjust speed, and avoid collisions while navigating through traffic. Similarly, robots use mathematical equations to control their movements and perform tasks with precision. The integration of mathematics ensures that these systems operate accurately, efficiently, and safely, demonstrating the importance of mathematical concepts in developing intelligent and reliable technologies.



AI TOOLS IN MATHEMATICS

The advancement of artificial intelligence has led to the development of various tools that make learning mathematics easier and more interactive for students. AI-powered platforms such as Wolfram Alpha, Symbolab, Mathway, and Microsoft Math Solver provide instant solutions to complex mathematical problems along with detailed step-by-step explanations. These tools help students understand difficult concepts by breaking them down into simpler steps, making learning more accessible and engaging.

They also allow learners to practice problem-solving at their own pace and receive immediate feedback, which enhances their understanding. However, while these tools are highly beneficial, it is important to use them responsibly, as over-reliance on such technologies may reduce independent thinking and problem-solving abilities. When used correctly, AI tools can act as powerful learning aids, supporting students in developing strong mathematical skills.



Human and AI COLLABORATION:Case Studies

Human + AI Collaboration

Artificial intelligence is transforming the education system by introducing innovative methods of teaching and learning. One of the key advantages of AI in education is personalized learning, where students receive content tailored to their individual needs and learning pace. AI systems can analyze student performance and provide instant feedback, helping them identify their strengths and areas for improvement. This makes the learning process more efficient and effective. However, the integration of AI in education also presents challenges, such as concerns related to data privacy, over-dependence on technology, and reduced critical thinking skills among students. Additionally, there is a need to ensure that AI-based education is accessible to all students, regardless of their socio-economic background. Despite these challenges, the collaboration between humans and AI offers great potential. While AI can process data quickly and provide solutions, humans contribute creativity, emotional intelligence, and ethical judgment, making this partnership essential for achieving better outcomes in education.

CASE STUDY I:

A realistic example of AI in education can be seen in intelligent tutoring systems developed by organizations like Carnegie Learning. These AI-based platforms provide personalized math tutoring by analyzing how students solve problems and offering step-by-step guidance tailored to their needs. Studies have shown that students using such systems often perform better academically because they receive immediate feedback and targeted support. In this case, AI does not replace the teacher but acts as an assistant, enhancing the overall learning experience and helping students build a stronger understanding of concepts.



CASE STUDY 2:

Another interesting case study highlights the collaboration between humans and AI in creative fields. Artists have started using AI tools like DeepDream to enhance their artwork. For example, a digital artist can input a simple image, and the AI transforms it into a complex and visually striking design by identifying patterns and adding artistic effects. While the AI provides computational creativity, the human artist guides the process by choosing inputs, refining outputs, and adding emotional and aesthetic value. This collaboration demonstrates that AI is not replacing human creativity but rather expanding its possibilities.



These case studies clearly show that the best results are achieved when humans and AI work together. AI excels at processing large amounts of data quickly and accurately, while humans contribute critical thinking, creativity, and emotional understanding. This balance is especially important in education, where learning is not just about solving problems but also about developing reasoning and analytical skills. Therefore, the integration of AI should be done thoughtfully, ensuring that it supports human learning rather than replacing it, ultimately leading to a more effective and balanced educational system.

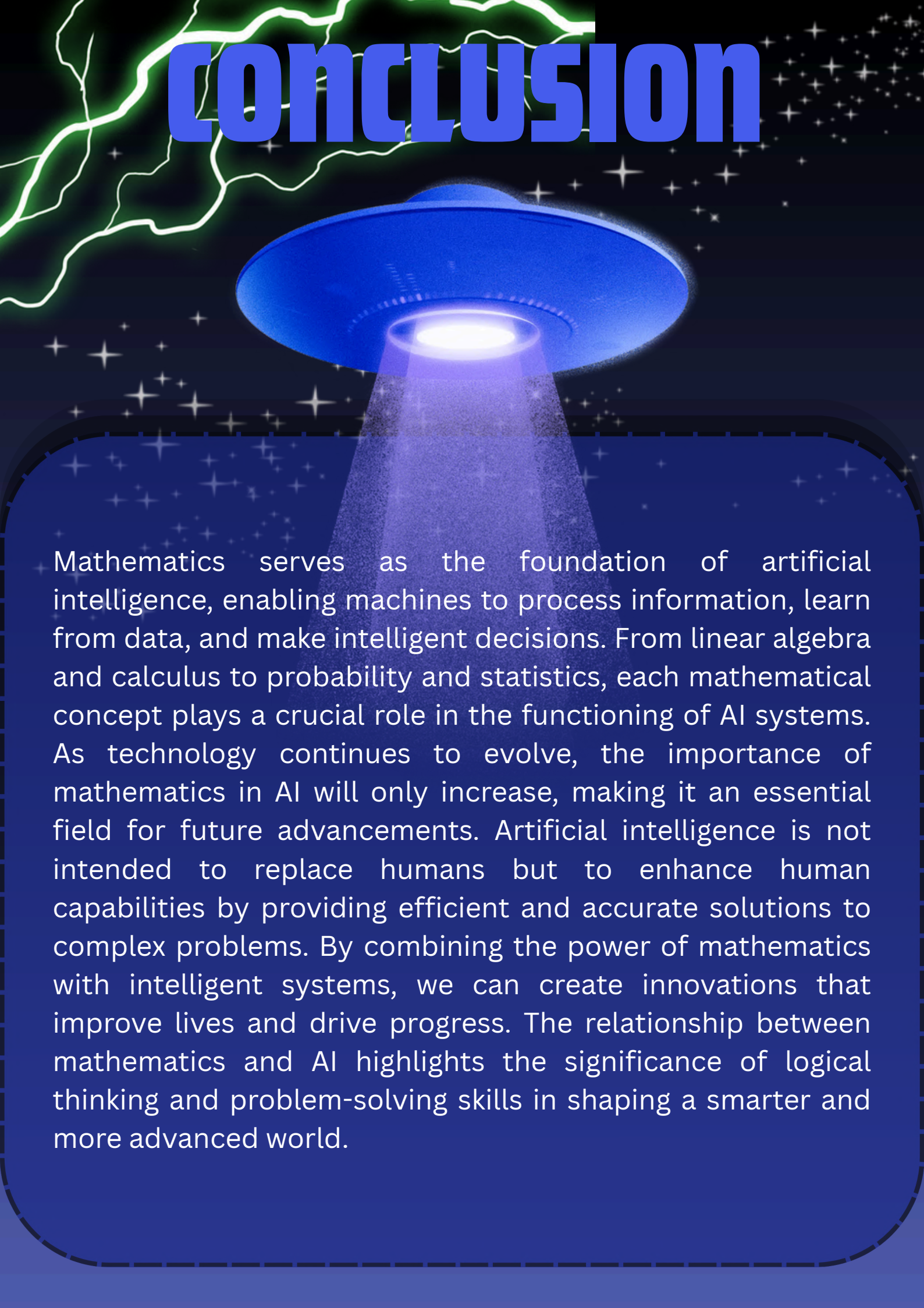
AI in Education: Opportunities and Challenges

Artificial intelligence is bringing significant changes to the field of education by making learning more personalized and efficient. One of the major advantages of AI in education is its ability to adapt to individual learning needs. AI systems can analyze student performance and provide customized content, helping learners progress at their own pace. Additionally, AI enables 24/7 access to learning resources and offers instant feedback, making education more flexible and accessible.

Despite these benefits, there are several challenges associated with the use of AI in education. Concerns related to data privacy and security are becoming increasingly important as student data is collected and analyzed. There is also a risk of over-dependence on technology, which may reduce critical thinking and problem-solving abilities among students. Furthermore, unequal access to technology can create a gap between students from different socio-economic backgrounds. Therefore, while AI has the potential to improve education, it must be implemented carefully to ensure that it supports learning without creating new challenges.



CONCLUSION

A blue UFO is positioned in the upper center of the image, emitting a bright, glowing light beam that tapers downwards. The background is a dark blue space filled with numerous small, white, star-like specks. In the upper left corner, there are jagged, green lightning bolts. The overall scene has a futuristic and mysterious feel.

Mathematics serves as the foundation of artificial intelligence, enabling machines to process information, learn from data, and make intelligent decisions. From linear algebra and calculus to probability and statistics, each mathematical concept plays a crucial role in the functioning of AI systems. As technology continues to evolve, the importance of mathematics in AI will only increase, making it an essential field for future advancements. Artificial intelligence is not intended to replace humans but to enhance human capabilities by providing efficient and accurate solutions to complex problems. By combining the power of mathematics with intelligent systems, we can create innovations that improve lives and drive progress. The relationship between mathematics and AI highlights the significance of logical thinking and problem-solving skills in shaping a smarter and more advanced world.

SECTION 4

HUMAN INTELLIGENCE VS ARTIFICIAL INTELLIGENCE



HUMAN VS AI: COMPETITION OR COLLABORATION?

This is the biggest question that comes to our minds. However, the answer is a little complicated to understand. Whenever we talk about AI and Human Intelligence we always talk about how AI is replacing humans at jobs from decades now. Even though, it isn't the real truth because the most successful people in 2026 aren't fighting AI, instead they are "co-piloting" with it.

So there is no lie in the fact that these two aren't replacements to each other but building each other.

The simplest way to understand the relation between the two is as an example of **GPS**. A GPS is better than a human at calculating a million possible routes in a second, but it doesn't know why you are traveling.

So the end goal is partnership, using both logics at the same team to build something even more beautiful than the two can build separately. In 2026, using AI is equally important to compete in the market, however, one shouldn't lose their creativity to it.



ARTEMIS II



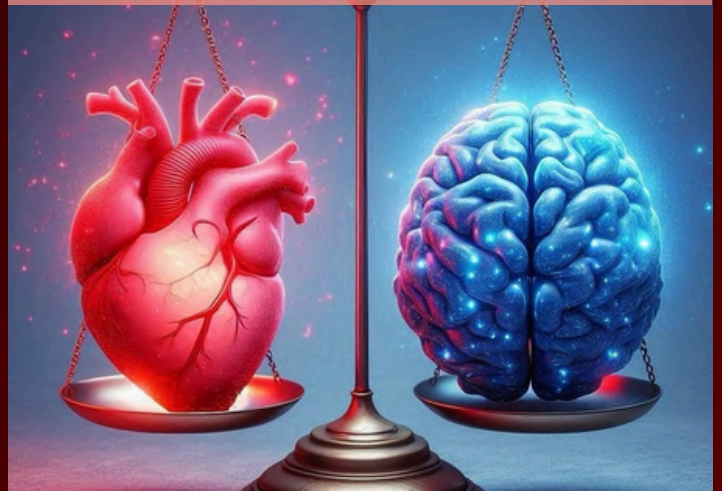
Can AI solve problems better than humans?

Human vs AI problem solving is like an Equation and Conversation. In 'Closed Systems', AI resides in systems such as a Chess game or math workbook. In these places, the rules remain unchanged. This is where AI employs Optimization, finding the fastest possible route to finish. When needed to find small errors in 10,000 lines of code, AI is mathematically superior and quicker than any human.

Reading this entire thing sounds like a trap. AI, please summarize this before I die of old age.

But life in real life is "Open System." It is messy and unpredictable. Humans apply Context this is where it comes in. An AI may, for example, suggest the "perfect" logical solution to a problem that hurts people or ignores history. A human has this innate quality of understanding that the world is not simply a pay with numbers but rather a system where people operate in.

To understand the two better, we could say that we use AI for the heavy calculations and long procedures and then humans are left to decide how AI should process. Yet, a question arises that if a problem is being solved, then is it mandatory to understand that it is actually solved by humans or by AI or just be concerned with the problem being solved, since if it solved by human, we know it's context and understand the deep meaning behind it but with AI it's originality and meaning is completely lost.



AI GENERATION VS HUMAN CREATION: CREATIVITY SHOWDOWN

We often have this misconception of AI being better than humans. However, looking it through a different lens we learn that AI is basically using existing examples of humans for its role.

AI is essentially looking backward. It functions by analyzing millions of existing human works to predict what should come next based on probability. This is known as "Generative" creation, it builds something new by remixing the past. While it can produce a beautiful result, it doesn't understand the reason behind the art. It isn't motivated by a broken heart, a dream, or a sunset; it is simply following a complex mathematical pattern to satisfy a prompt.



Human Creation, on the other hand, is driven by the ability to look forward and act on pure inspiration. A human artist has the unique power to be irrational. They can choose to do something that makes no sense logically but feels right emotionally.



Ultimately, the creativity showdown is a battle between Probability and Possibility. AI is a master of the "Probable" that is predicting what is most likely to look good or sound right based on history. Humans are the masters of the "Possible" which means imagining things that have a 0% probability of existing until we decide to create them. In 2026, we see that while AI can produce a beautiful product, it lacks the "creative spark" required to change the very rules of the game.

ETHICS OF AI IN MATHEMATICS



Mathematics is known as the "Universal Language" and this is because it has foundations of pure factual truth. But as we bring our first AI to this area, the so-called "Ghost in the Machine" problem arises. As time passes, we see that the AI systems find new ways to solve these super-complex equations like some natural group theory and abstract algebra or whatever, but dense enough these researchers couldn't read them in general? This leads to the "Black Box" problem of ethics.

If AI generates a correct answer but its reasoning is opaque, we lose the most essential aspect of higher mathematics- proof. In mathematics the "how" is as important as the "what." If we cannot properly justify the steps, we risk a crisis of confidence which means if we accept results without properly understanding how they come to pass then we only have faith in some learning black box rather than knowledge of nature.

For a student, the struggle of working through a difficult integration or a logical proof is exactly what builds mathematical intuition. If we rely on AI as a shortcut, we might get the right marks, but we lose the cognitive growth that comes from the challenge. Therefore, in a world where machines can calculate everything in an instant, being "good at math" is changing. It is moving away from just finding the right answer and toward the human ability to ask the right questions, verify the logic, and ensure that the math we use is fair, transparent, and true.



CONCLUSION

As we move through 2026 the line between Human Intelligence and Artificial Intelligence is not something that separates us. It connects us. Artificial Intelligence gives us the power to do things that would take time like looking at billions of problems and solving them to find answers.

However, it is important to understand that Artificial Intelligence can find the way to get somewhere but only humans can decide if it is worth going to that place.

Similarly, Artificial Intelligence is very good at guessing what will happen next based on what happened but humans have the ability to create new things that have never been seen before.

Especially when we are talking about Mathematics so just getting an answer is not enough if we do not understand how we got that answer.

In this partnership Artificial Intelligence does the math and humans figure out what it means. The future is not about the machines or just about humans working alone but, about people who work together with Artificial Intelligence to make something new that they could not have made by themselves.





FUTURE OF MATHEMATICS IN VARIOUS FIELDS

05 Section

Over the years, mathematics has done immense growth in many fields of technology. There is no lie in the fact that everything around us is based on various branches of mathematics. However, mathematics is predicted to do even better growth in various fields.

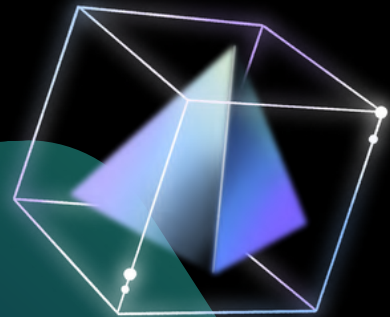


TO MENTION SOME:



Caring for the Earth:

Math plays a big role in understanding climate change and managing our natural resources. By improving weather forecasts and tracking pollution, we support leaders in planning for a better future.



Protecting the Planet:

Mathematics is essential for studying climate change and managing our natural resources. By building better models for weather forecasting and pollution tracking, we can help leaders plan for a sustainable future.

Building Better cities:

Math helps make traffic flow smoothly, cut down on energy use in buildings, and plan good public transport routes. With AI processing live data, mathematicians assist in making cities more enjoyable and sustainable.

Smart cities and Urban Planning:

Mathematics is used to optimize traffic flow, reduce energy consumption in buildings, and design efficient public transport routes. By using AI to process real-time data, mathematicians help create cities that are more liveable and sustainable



CAREERS AT THE INTERSECTION OF MATH AND AI

The intersection of mathematics and Artificial Intelligence is not just a field of study but a way to some of the most dynamic careers of the next decade. As industries move from intuition to data-driven strategy, the demand for "mathematical architects" is skyrocketing.

DATA SCIENCE

The professionals who work in this sector employ statistics, coding, and mathematical models to derive practical solutions from data sets. As all industries today rely on data, this career track remains among the fastest-growing ones in the world.

MACHINE LEARNING ENGINEERING

Specialists who design "minds" of artificial intelligence systems fall into this category. By developing algorithms through which these systems can learn from their own experience, these individuals are responsible for making machines smart. Mathematics is crucial in these roles for achieving accuracy and efficiency in the systems designed by machine learning engineers.

RESEARCH POSITIONS

People with a love of exploration should consider careers related to applied mathematics or artificial intelligence research. They will be working with the development of novel theories and improved computation techniques.

Other specialties requiring advanced expertise in mathematics, careers in Cryptography, Quantitative Finance, and Computational Biology are among other options for mathematics majors to explore.

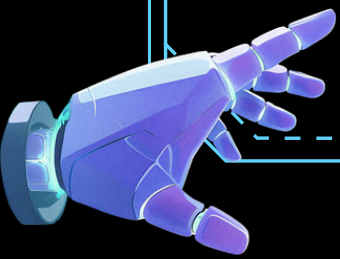
VISION 2050: MATH, AI, AND THE POWER OF IMAGINATION

As we look toward the year 2050, the relationship between humans and technology is moving toward a grand expansion rather than a replacement. Mathematics will remain our core language, but AI will act as the engine that allows us to explore ideas faster than ever before.



New Ways to Innovate:

By 2050, AI-assisted mathematical innovations will be a part of all mathematicians' daily activities and allow humans to solve enormous issues that are too complicated for us now.



Human Efficiency:

Techniques such as Generative Design will make it possible for architects to type in their objectives such as maximum illumination or minimal carbon footprint and then use AI's abilities to analyze geometrical formulas and present tens of thousands of different building ideas

Hybrid Careers:

In the future, the individuals who can combine their creative and analytical skills will be most successful. Those mathematical imagination hybrids will become crucial when dealing with such complex areas as space exploration, graphic design, and medicine.

Education:

The new approach to learning mathematics will require students to understand critical concepts, collaborate with machines, and address open challenges that lack a universal solution.



Human Efficiency:

Humans will still generate goals, values, and meaning because while AI will be able to do calculations, it will not be able to set priorities or make decisions. The role of imagination will remain crucial since only people will define which challenges need addressing and how to use available technologies.

CONCLUSION

Mathematics is no longer just a basic tool; it's becoming a lively structure influencing every part of our world. As 2050 gets closer, math and Artificial Intelligence are teaming up to change areas like city planning and environmental science, turning difficult numbers into ways to help our cities and the Earth thrive. This change is ushering in a new wave of "mathematical architects"-experts in data science and machine learning using smart algorithms to tackle big global issues. But this tech jump doesn't replace our creativity; it boosts it. AI helps with fast calculations and clever designs, but we still need people to guide it with our imagination, ethics, and smart decisions-things technology can't do. The future is about teamwork between math and creativity, letting us dream and build like never before.



SECTION 6: LEARNING & EXPLORATION



Logic & Reasoning Corner

(Sharpen Your Thinking Skills)

Puzzle 1: Function Flow Challenge

If a function transforms numbers as:

Step 1: Multiply by 2

Step 2: Add 3

And another function:

Step 1: Square the result

>> What happens when both functions are applied together?

This reflects how composite functions work in mathematics ($a \rightarrow b \rightarrow c$), similar to how neural networks process data layer by layer.

If the input is x , the final result becomes:

First function $\rightarrow 2x+3$

Second function $\rightarrow (2x+3)^2$

This is called a **composite** function, where the output of one function becomes the input of another.

Why it matters:

In Artificial Intelligence, especially neural networks, data flows through multiple layers just like this—each layer transforms the input step by step.

Puzzle 2: Probability Twist

You roll two dice.

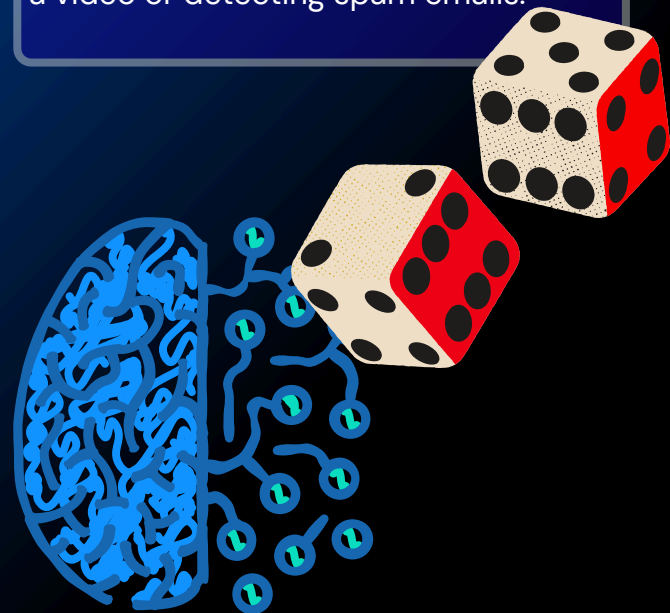
- Total possible outcomes = $6 \times 6 = 36$
- Favourable outcomes for sum = 7 $\rightarrow (1,6), (2,5), (3,4), (4,3), (5,2), (6,1)$

>> Total favourable outcomes = 6

>> Probability = $6 / 36 = 1/6$

Connection to AI:

AI systems constantly calculate probabilities like this to make predictions—whether it's recommending a video or detecting spam emails.



Puzzle 3: Pattern Logic

Find the next number: 2, 6, 12, 20 ?

Solution:

Differences $\rightarrow +4, +6, +8 \rightarrow$ next $+10$

Answer = 30

>> Observe differences carefully — this reflects **mathematical reasoning used in algorithms**.

Why this section matters:

Logical reasoning forms the backbone of AI systems. Logic and reasoning are not just academic—they are the foundation of how machines “think.” Every AI decision is based on patterns, probabilities, and structured reasoning. Whether it's solving puzzles or optimizing models, reasoning helps machines (and us!) make better decisions.

Learn With Us: Quick Concepts in Math & AI

(Simple ideas. Big impact.)

Calculus is the mathematics of change and motion. According to your source material, it helps break down complex systems into smaller, understandable parts and then recombine them to see the whole picture.

1. Calculus – Understanding Change

Calculus helps us study how things change continuously. In AI, it is mainly used for training models through optimization.

- Derivatives → Measure rate of change
- Integration → Measures accumulation
- Gradient Descent → Minimizes errors

Think of it like adjusting volume sliders in a music system—fine-tuning until the sound is perfect.

AI models (like neural networks) are actually combinations of many continuous functions, and calculus helps us understand and improve them.

Cool Connection: Sound & Calculus (Where Mathematics Meets Music)

Have you ever wondered how your favorite song, a guitar note, or even your voice travels through the air and reaches your ears? Surprisingly, the answer lies in mathematics—specifically calculus and wave analysis.

According to the concepts discussed in the source material, sound is not just a single vibration. Instead, it is a combination of many simple waves working together. The most basic of these is the sine wave, a smooth and continuous oscillation that represents pure sound.

 From Simple Waves to Complex Sounds
A simple sine wave produces a clean and single tone, like a tuning fork. But in real life, sounds are much richer and more complex.

For example:

- A guitar string doesn't produce just one wave
- It creates multiple waves of different frequencies
- These waves combine to form a complex waveform

This combination of waves is what gives each instrument its unique sound quality (timbre).



>> Breaking Sound into Pieces: Fourier Transform

To understand complex sounds, mathematicians and engineers use a powerful concept called the Fourier Transform.

>> It breaks down a complex wave into many smaller sine waves

Think of it like this:

- A song = mixture of many frequencies
- Fourier Transform = separates each frequency
- Result = we can analyze, modify, or recreate the sound

Connection with Calculus

Calculus helps us:

- Understand continuous wave patterns
- Analyze how waves change over time
- Measure properties like frequency and amplitude

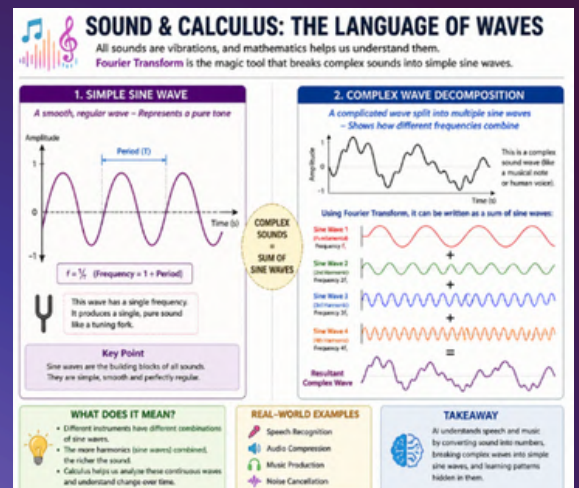
Since sound waves are continuous, calculus becomes essential in studying and processing them.

How AI Uses This Concept

Modern AI systems use these principles in real-world applications:

- 🎤 Speech Recognition (like voice assistants)
- 🎧 Music Streaming Platforms (audio compression & enhancement)
- 🗣️ Noise Cancellation Systems
- 🧠 Language Processing Models

AI converts sound into mathematical signals, breaks them into components, and then processes them to understand meaning.



"Every sound you hear is a combination of invisible mathematical waves—and calculus helps us decode them."



2. Probability & Statistics – Dealing with Uncertainty

(How AI Makes Smart Decisions in an Uncertain World)

In the real world, not everything is predictable. Whether it's weather forecasting, stock markets, or even human behavior, uncertainty is everywhere. This is where probability and statistics come into play.

As described in our study material, probability acts like a compass, helping Artificial Intelligence navigate situations where outcomes are not certain. Probability is the language of uncertainty in AI. It allows machines to predict outcomes even when data is incomplete.

Key ideas:

- Random Variables → Possible outcomes. For example, when rolling a dice, the result (1 to 6) is a random variable.
- Probability Distribution → Likelihood of outcomes. Some events are more likely than others, and probability helps us measure that likelihood.
- Bayesian Thinking → Updating beliefs with new data. For example, in tossing a coin → {Heads, Tails}



$$P(A|B) = \frac{P(B|A) P(A)}{P(B)}$$

Example:

When Netflix recommends movies, it uses probability to guess what you'll like next.

Understanding How AI Thinks

Unlike humans, AI systems don't "know" answers with certainty. Instead, they calculate probabilities based on data.

For example:

- An email may have a 90% chance of being spam
- And a 10% chance of being important

Based on this, the system decides what action to take.

>> This approach allows AI to make informed decisions even when data is incomplete or uncertain. Bayesian Thinking – Learning from New Information

One of the most powerful ideas in probability is Bayesian thinking.

It means:

>> Updating beliefs when new information is received

For example:

- Initially, an email might seem normal
- But after detecting suspicious keywords, the probability of it being spam increases

AI continuously updates its predictions in this way, becoming smarter over time.

Real Applications:

- Chatbots
- Image recognition
- Recommendation systems



3. Linear Algebra – The Data Engine

Linear algebra helps AI handle large amounts of data efficiently.

Core concepts:

- Vectors → Represent data points
- Matrices → Store datasets
- Matrix Multiplication → Drives neural networks

Example:

Every image you upload is converted into numbers and processed using matrices



4. Neural Networks – Learning Like Humans

Neural networks don't just memorize—they learn patterns.

- They detect features (like shapes in images)
- They improve using feedback (backpropagation)
- They operate in high-dimensional spaces

Fun fact:

AI models can think in thousands of dimensions, far beyond human imagination!



Data Stories: Math Through Real Data

(Where numbers tell stories)

Story 1: The Power of Trends

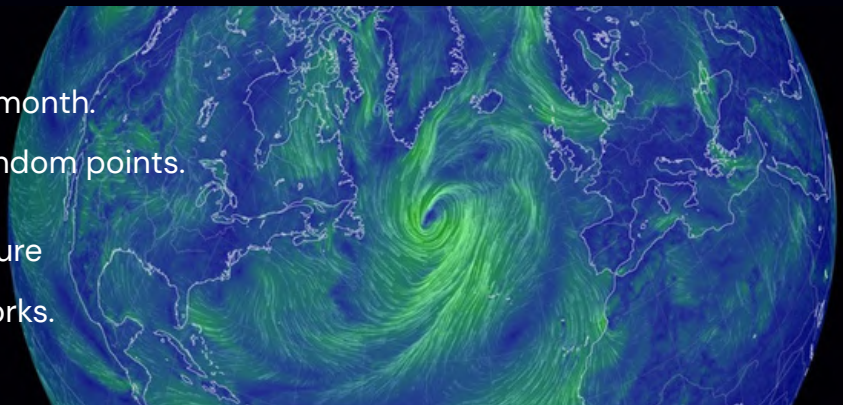
Imagine tracking daily temperatures for a month.

Plotting this data gives you a curve, not random points.

>> Calculus helps analyze this curve

>> Statistics helps predict future temperature

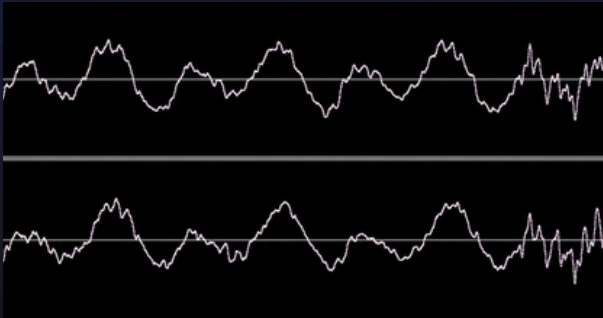
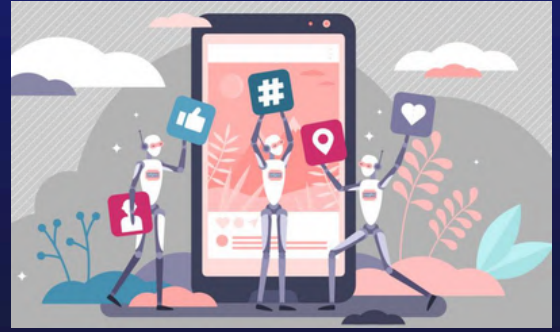
This is exactly how weather forecasting works.



Story 2: Social Media Algorithms

Every like, share, and comment generates data.

- Probability predicts what content you'll engage with
 - Linear Algebra processes massive datasets
 - AI models decide what appears on your feed
- >> That's why your feed feels "personalized".



Story 3: Music & Mathematics

Did you know?

Every sound can be broken into sine waves.

- Complex music = combination of simple waves
- AI uses this concept in speech recognition & audio processing

Story 4: Decision Making in AI

Self-driving cars rely on probability to:

- Predict traffic movement
- Avoid collisions
- Choose safest routes

>> Math literally helps machines make life-saving decisions.



"AI doesn't just learn data — it learns patterns, relationships, and possibilities using mathematics."

Conclusion

Mathematics is not just a subject—it is the foundation of modern technology.

From solving puzzles to powering artificial intelligence, concepts like calculus, probability, and linear algebra shape the world around us.

Understanding these ideas doesn't just help in exams—it helps us understand how the future works.

SEEK

7

STUDENT INNOVATION & EXPRESSION

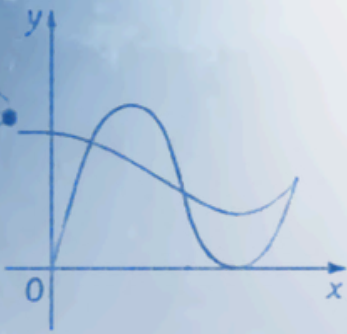


STUDENT ARTICLES



Article 1: This Is How AI mimics the human brain — And Why It's Mind-Blowing

Article 2: Can Mathematics Help Prevent Digital Abuse?



ARTICLE I

This Is How AI mimics the human brain — And Why It's Mind-Blowing



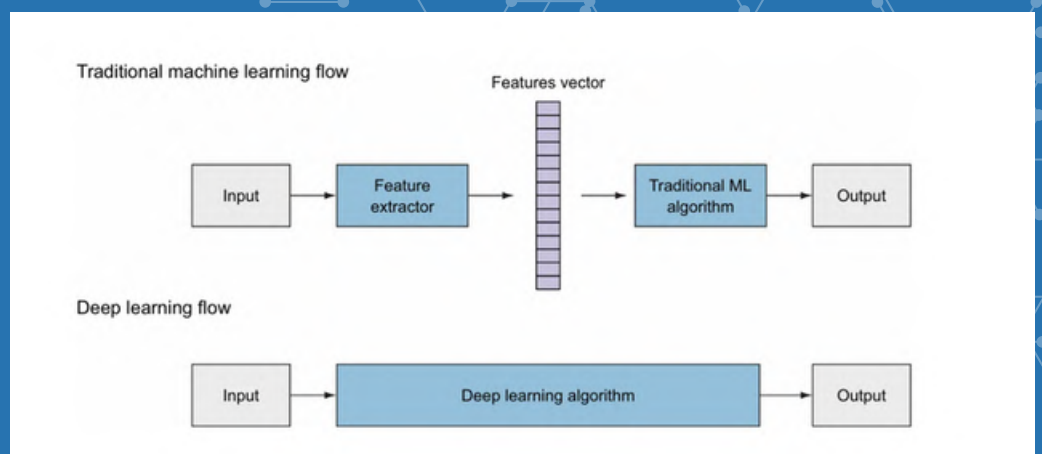
ARYAN PRASAD

Shaheed bhagar singh college(M)

Bsc. (H) Mathematics

NEURAL NETWORK

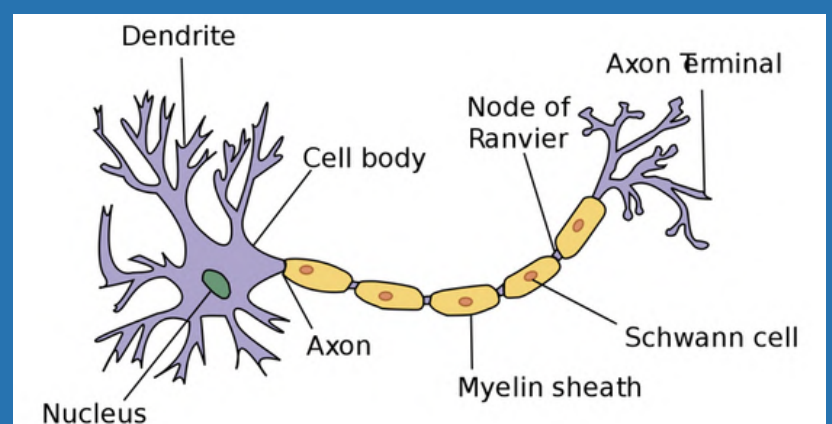
A neural network is a type of machine learning model inspired by the structure and functioning of the human brain. It consists of interconnected nodes, or neurons, organized in layers. These layers typically include an input layer, one or more hidden layers, and an output layer. Each neuron receives input, processes it through an activation function, and passes the output to the next layer.



NEURON IN BIOLOGY

A neuron by itself is useless. Instead, we require a network of neurons to generate a number any meaningful functionality. This is because neurons function by receiving and sending signals. More specifically, the neuron's Dendrites receive signals and pass along those signals through the Axon.

The dendrites of one neuron are connected to the axon of another neuron. These connections are called synapses.



NEURON IN DEEP LEARNING

Neurons in deep learning models are the nodes through which the data and computations flow.

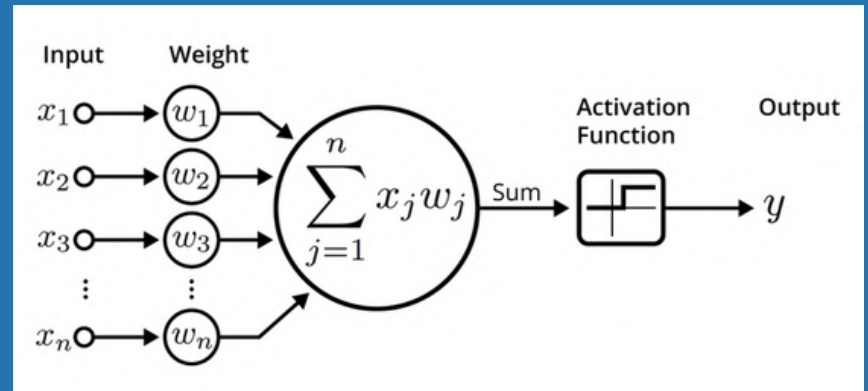
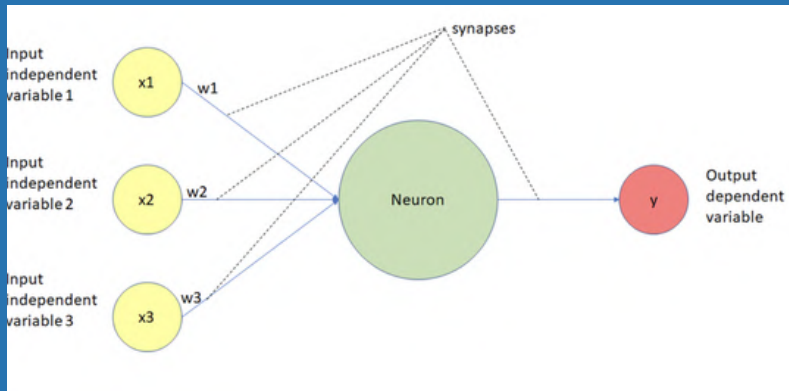
Functioning of a neuron in deep learning

- They receive one or more input signals. Neurons in deep learning models are nodes through which data and computations flow.
- They perform some calculations.
- They send some output signals to neurons deeper in the neural net through a synapse.

Neurons in a deep learning model are capable of having synapses that connect to more than one neuron in the preceding layer. Each synapse has an associated Weight. Weighted connections represent the strength of the links between neurons. When training an algorithm to optimize network performance, you adjust those weights and reduce the differences between its predictions and the target values.

Once a neuron receives its inputs from the neurons in the preceding layer of the model, it adds up each signal multiplied by its corresponding weight and passes on them to an activation function.

The activation function calculates the output value for the neuron. This output value is then passed on to the next layer of the neural network through another synapse.

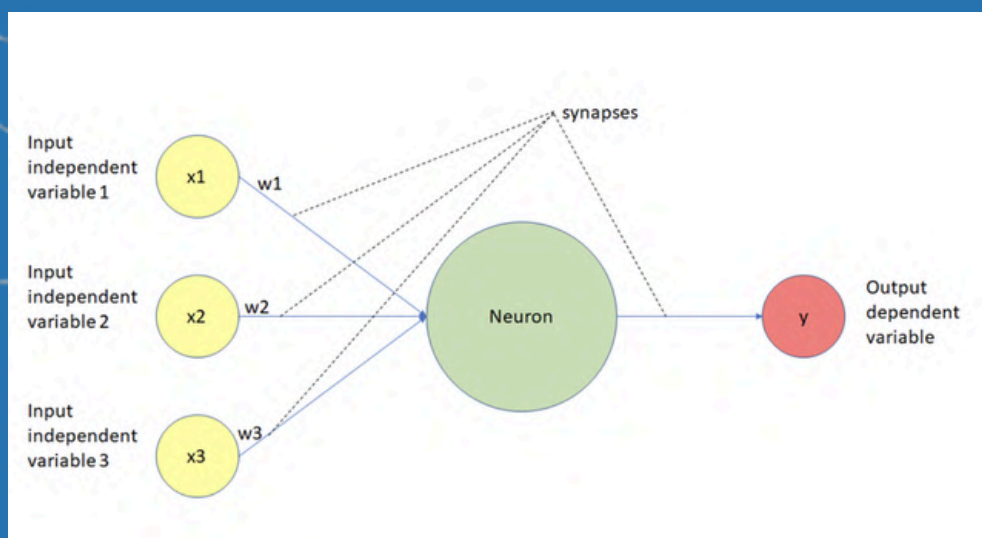


TYPES OF ACTIVATION FUNCTION

- Threshold functions- They compute a different output signal depending on whether or not their input lies above or below a certain threshold.
- Sigmoid functions - map inputs to a range between zero and one in traditional neural networks
- Rectifier function - used in deep learning to return the input for positive values or zero for negative values
- The hyperbolic tangent function, which maps inputs to a range between negative one and one in a neural network

NEURAL NETWORKS IN THE REAL WORLD

- Stock Exchange Prediction:- Making predictions on the stock exchange by using parameters, such as current trends, political situation, public view, and economists' advice, can be done with neural networks.
- Bank fraud system:- You can provide a dataset that includes past bank fraud details. You can then detect and predict bank fraud by training the developed model with the given dataset.
- In a recommendation system:- RNN is the type of neural network that is mostly used in recommendation systems. Searching platforms such as Google and Yahoo also use advanced types of neural networks to improve their user experience. This significantly improves the usability of the search engine
- Tesla Car:- Tesla is a company that highly makes use of neural networks in their products. The Tesla car is one of the most famous inventions of that company. It is an autopilot car that figures out the optimal route, manages complex intersections with traffic lights, and navigates urban streets while moving at high speed.



ARTICLE 2

Can Mathematics Help Prevent Digital Abuse?

By- Yashika Sharma
Mathematics Hons
Gargi College

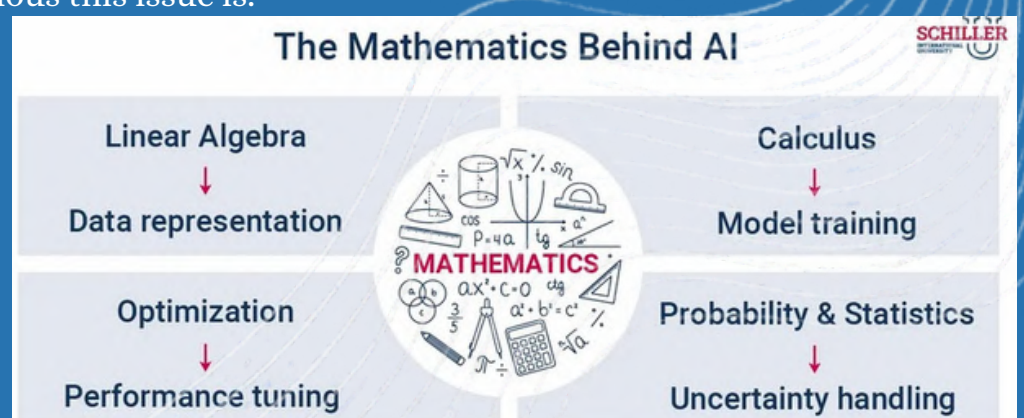


Cyberbullying is a form of bullying that happens through digital platforms such as social media, messaging apps, online games, and websites. It involves using technology to harass, threaten, embarrass, or target another person repeatedly. Unlike traditional bullying, cyberbullying can happen anytime and can reach a person even when they are at home, making it harder to escape. It often includes actions like spreading rumors online, sending hurtful messages, sharing private photos without permission, or publicly humiliating someone. Because the internet allows messages to spread quickly and anonymously, the impact can be very severe. Victims of cyberbullying may feel anxious, isolated, or depressed. It can affect their confidence, mental health, and overall well-being. As digital communication becomes a big part of everyday life, cyberbullying has become a serious social issue. Addressing it requires awareness, empathy, and responsible online behavior from everyone.

ROLE OF MATHEMATICS

Math is key to grasping just how big the cyberbullying problem is. By gathering data and running surveys, we can actually put a number on how often cyberbullying happens across different ages and websites.

Think of it this way: we can figure out the fraction of mean posts or see how things have gotten better (or worse) over the years. These hard numbers are what help experts and the platforms themselves figure out who's hurting the most and where they need to step in. Honestly, without basic math tools like averages, percentages, and charts, we wouldn't even be able to tell how truly serious this issue is.

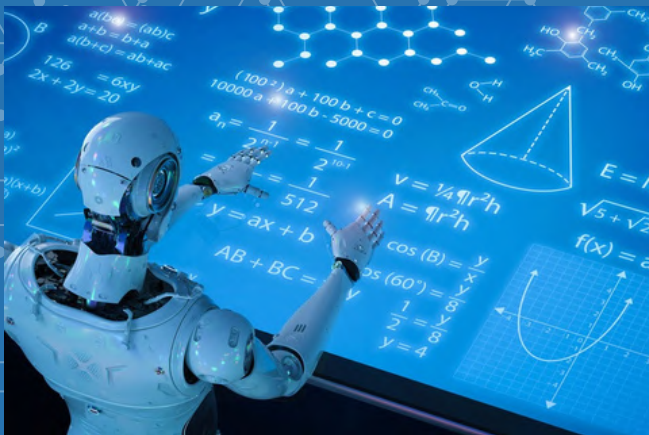


ROLE OF AI

Think about the link through artificial intelligence—it's essentially built on math. Social media companies use AI to spot nasty or mean comments. These systems learn from massive amounts of data and are all about probability and recognizing patterns. So, when someone posts something, an algorithm essentially gives it a "toxicity score" based on how likely it is to be offensive. This score comes from the mathematical equations powering the machine learning. They're not flawless, but they prove how math can be a tool for automatically cleaning up harmful content.

AI + MATHEMATICS

Graph theory gives us a really fascinating and unique way to look at this. Think of social media like a massive web. Every user is a dot, and every time they interact, that's a line connecting them. In these webs, cyberbullying can just explode, spreading like wildfire from one person to the next. Some people have way more influence or connections, making them the central hubs that pump out all the negativity. By actually crunching the numbers on these patterns, we can pinpoint the main troublemakers and shut down the harmful behaviour right at the source. This way, we see that cyberbullying isn't just about a few bad apples; it's a problem with the whole network.



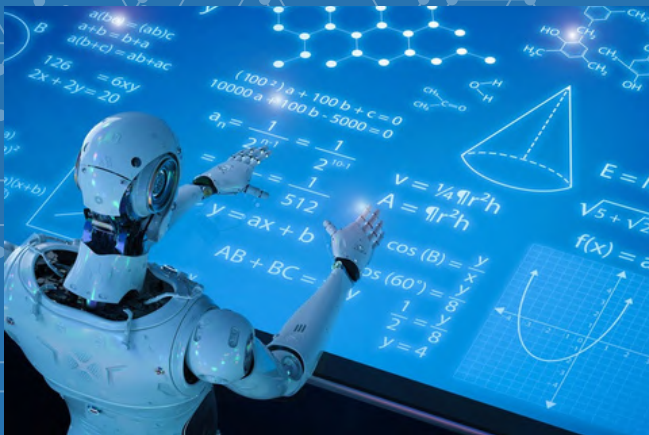
Math also comes in handy for figuring out the best solution. Platforms are constantly trying to cut down on toxic stuff without silencing people's right to speak their minds. It's a huge headache: how do you keep things safe while still letting freedom ring? Using mathematical optimization techniques, companies try to build algorithms that minimize truly awful posts without accidentally blocking perfectly normal conversations. It's a perfect example of how math is actually used to sort out sticky, real-world problems.

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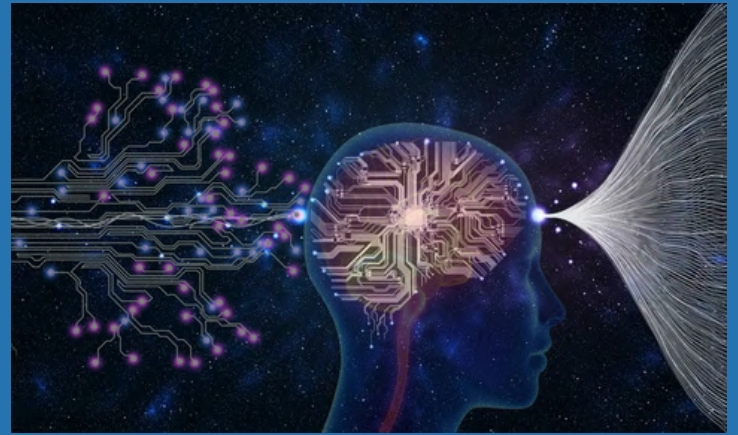
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ROLE OF HUMAN INTELLIGENCE

But here's the thing: math and AI can only take us so far. We really need human intelligence because we're the ones who truly grasp feelings, the context of a conversation, and what someone actually means. Think about it—a computer program could easily miss a sarcastic comment, but a person would catch it right away. So, the best strategy is to mix those mathematical tools with good old human judgment. This combination gives us the accuracy of a machine and the necessary sensitivity when dealing with something as personal as cyberbullying.



To wrap up, while cyberbullying feels like a purely social problem, mathematics actually offers some incredibly powerful ways to study and fight it. Everything from stats and AI programs to looking at networks and finding the best solution helps us spot patterns and develop fixes. When we pair this with what only humans can bring to the table, we create a much more robust approach to making the internet safer for everyone. This proves that math isn't just dry equations; it's a practical tool that can genuinely improve people's lives.

IT STARTS WITH A QUESTION

Innovation doesn't always start in a laboratory. More often, it begins with a simple question in a student's mind—

“Why does this happen?” or “Can there be a better way?”

Every time we pause to question something, we take a small step towards creating something new. Today's students are not just following methods—they are exploring them. From building small classroom models to developing apps or finding smarter ways to learn, innovation is becoming a part of everyday student life. In reality, innovation is not always about big inventions. Sometimes, it is as simple as improving how we study, organizing a group activity more efficiently, or solving a common problem with a fresh perspective. With easy access to technology and information, students today have more opportunities than ever to turn their ideas into reality. However, the real challenge is not the lack of resources—it is the mindset. When students are encouraged to think independently, experiment freely, and even accept failure as part of learning, they begin to develop confidence. And that confidence is what turns ideas into innovation. After all, every great innovator was once just a student with a curious mind.

LET THEM SPEAK

Every student has thoughts.

But not every student feels confident enough to express them.

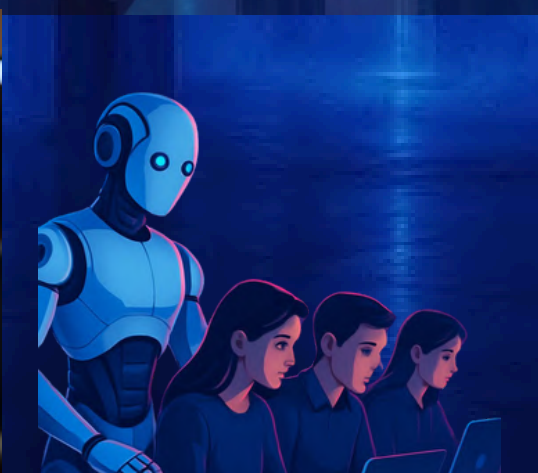
Many times, we have ideas in our minds but hesitate to share them.

In today's fast-moving world, students are constantly learning, adapting, and observing. They form opinions, question ideas, and develop perspectives—but often, these thoughts remain unspoken. The fear of being judged, misunderstood, or ignored holds many voices back.

Expression is not just about speaking or writing. It is about being heard. It is about sharing ideas, emotions, and perspectives in a way that connects with others. Whether through words, art, discussions, or even small actions, expression helps students understand themselves better.

When students begin to express freely, something changes. They become more confident, more aware, and more open to different viewpoints. It creates a space where ideas can grow, and where individuals feel valued.

In many ways, expression is the first step towards change. Because when one voice speaks, it often gives courage to others to do the same. And sometimes, all it takes is one honest thought to start a meaningful conversation.



BEYOND BOOKS: LEARNING IN THE DIGITAL AGE

Earlier, students were mostly dependent on books. But today, the way students learn and create has changed significantly.

With the growth of technology, students now have access to tools that were once limited to professionals. This includes coding platforms, digital design tools, and various online learning resources that make learning more interactive and engaging. As a result, education is no longer confined to classrooms—students can now explore, learn, and create from anywhere.

Even in daily student life, tools like online videos, learning apps, and digital notes have made the learning process more flexible and personalized.

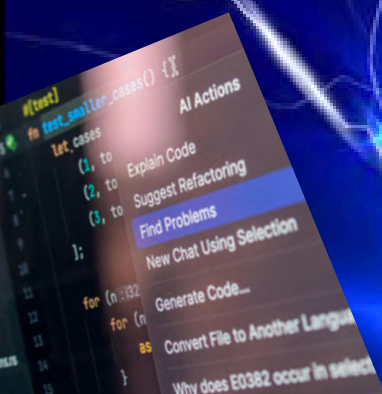
Today, a student in one part of the world can connect with others across the globe—learning from them while also inspiring them. This exchange of ideas has made innovation more accessible and dynamic than ever before.

However, the true value of technology depends on how it is used.

When used wisely, it can encourage creativity and lead to meaningful innovation. But when misused, it can limit a student's potential instead of enhancing it.

Technology may provide the platform, but it is the student's thinking that gives it direction.

The future belongs to those who not only use technology, but use it with purpose.





Why Your Voice Matters



Students today are not just learners—they are thinkers, creators, and future leaders. They observe the world around them, form opinions, and develop perspectives that are often fresh and meaningful. Whether it is about education, society, or global challenges, student voices bring insights that deserve attention.

When students speak up, they do more than share opinions—they challenge outdated ideas and introduce new ways of thinking. In many situations, when students share their perspective, it often brings a completely new way of looking at the same problem.



Even small contributions, like a suggestion in class or a discussion among peers, can lead to meaningful improvements.

History has shown that young voices have always played an important role in shaping change. From social awareness to educational reforms, student perspectives continue to influence the direction of society.

Listening to students is not just important—it is essential. Because today's student voice is tomorrow's direction.

Creativity, Everywhere

Creativity is often misunderstood. Many of us immediately think of activities like arts and crafts or making decorative items. However, creativity is not limited to these areas—it goes far beyond them.

In reality, creativity is present in everyday student life in ways we don't always notice. It can be seen in the way a student approaches a difficult problem, finds a new method to understand a concept, or manages time effectively during busy schedules. Even small decisions—like organizing notes differently or explaining a topic in a simpler way—reflect creative thinking.



In academics, especially in subjects like mathematics, creativity plays an important role. It is not just about finding the correct answer, but about exploring different ways to reach it. Sometimes, a unique approach can make a complex problem easier to understand.

Beyond academics, creativity is also visible in everyday activities. For example, planning a small event like a birthday celebration involves creativity in deciding themes, arranging decorations, and organizing everything in a unique way. Similarly, in today's digital world, students express creativity through social media—whether it is making engaging reels, capturing aesthetic photographs, or presenting ideas in a visually appealing manner.

These everyday actions may seem simple, but they show that creativity is not about doing something completely new—it is about doing things in a better or different way.

$$\frac{\partial u}{\partial t} + (u \cdot \nabla)u = -\nabla p + \nu \nabla^2 u$$

$$\pi(x) \sim \frac{x}{\ln x} \quad x \rightarrow \infty$$



Riemann Hypothesis

$$\zeta(s) = 0$$

$$\Rightarrow \operatorname{Re}(s) = \frac{1}{2}$$

In a quiet classroom, while most students were busy copying formulas from the board, Aanya sat still, staring at a single problem. It wasn't very long, and it didn't look impossible—but something about it didn't feel right.

"Find the value of x ," the question read.

Around her, pens moved quickly. Steps were being followed, formulas applied. But Aanya paused.

Instead of rushing, she asked herself a simple question:

Why does this method work?

That question changed everything.

While others focused on finishing quickly, she began to look at the problem differently. She drew a rough diagram, rearranged the equation, and even tried a few approaches that didn't work. But each mistake gave her a clue. Slowly, confusion started turning into clarity.

After a few attempts, she found a simpler path—one that didn't rely on memorized steps, but on understanding patterns and logic. And when she finally reached the answer, it wasn't just correct—it made sense.

■ Later, when the teacher asked for solutions, most students shared similar methods. Then Aanya explained hers.

For a moment, the classroom grew quiet.

Her method was shorter, clearer—and unexpectedly elegant.

That day, she didn't just solve a problem. She showed what mathematical thinking truly looks like.

Mathematics is often seen as a subject of formulas and fixed steps. But in reality, it is a way of thinking. It teaches us to question, to explore, and to look for patterns in the world around us.

Aanya's story reminds us that solving a problem is not about being the fastest—it is about understanding. It is about being curious enough to ask "why" and patient enough to explore different paths.

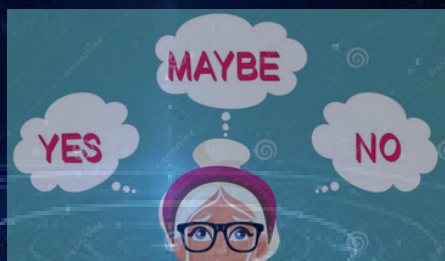
Many students believe there is only one correct way to solve a problem. But often, there are many.

And sometimes, the most meaningful solutions come from those who are willing to think a little differently.

The girl who solved the problem wasn't the fastest or the loudest.

She was simply the one who chose to think.

And that is the real power of mathematics.



SECTION -8



KIDS SOLVE PUZZLES.
AI STILL STRUGGLES WITH.
AI WRITES POETRY...
BUT CAN IT REALLY THINK?

BRAINS

VS

BOTS

THE MATH SHOWDOWN
YOU DIDN'T SEE COMING



THE PARADOX OF AI

ARTIFICIAL INTELLIGENCE IS EVERYWHERE TODAY. IT FEELS ALMOST MAGICAL.



It can write poems, compose music, solve difficult calculus equations, and even generate computer code within seconds.



But here's the surprising part: despite all these impressive abilities, AI often gets stuck on simple math puzzles that school students can solve easily. Sounds strange, right?



How can a machine that solves advanced equations fail at a basic riddle?



Researchers, including teams at Apple, tested AI systems using grade-school math problems. The results were unexpected.



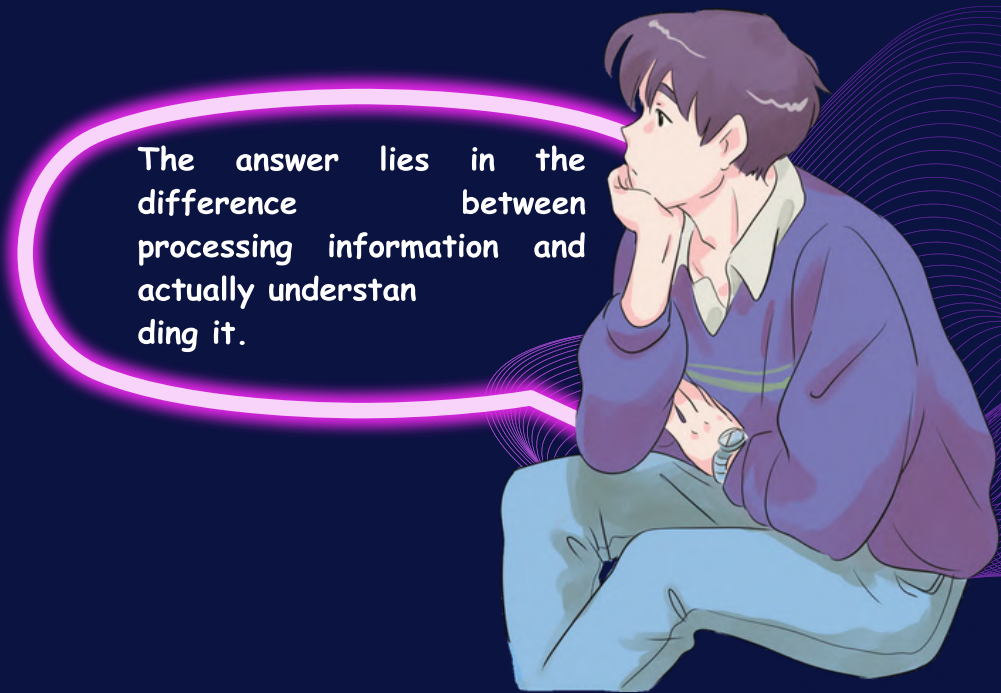
Even small changes, like replacing a name or changing a number, caused the AI to make mistakes.



This surprising contradiction tells us something important -> not just about the limitations of AI, but also about the incredible power of human thinking.



This raises an important question: If AI is so advanced, why does it struggle with problems that children can solve?



The answer lies in the difference between processing information and actually understanding it.



Let me tell you about

2

EXPERIMENTS

That show something really
interesting about **AI**.



1

WHEN BILL BREAKS THE BOT

Sophie has 31 building blocks, 8 stuffed animals, and 9 stacking rings. After buying some bouncy balls, she has 62 toys in total.

How many bouncy balls did she buy?

Most people solve this instantly.

Now researchers changed
"Sophie" to "Bill" and
replaced 31 with 19.
Suddenly, the AI got
confused

WHY???

Because humans understand the **logic** behind the problem. We know the **names don't matter**-the numbers do. AI often treats words and numbers as **separate tokens** it has memorized rather than concepts it truly **understands**.

"AI can imitate intelligence, but imitation is not the same as understanding."

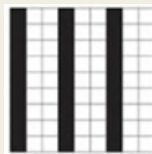
2

AI SEES STRIPES WHERE NONE EXIST

AI also struggles with visual puzzles.

In one experiment, it was shown a shaded grid and asked to calculate the fraction represented.

The AI confidently described four vertical stripes -even though there were only three.



A student, however, would quickly notice the pattern: each row contains three shaded squares, so the fraction is $\frac{3}{10}$.

We naturally recognize patterns, relationships, and structures.

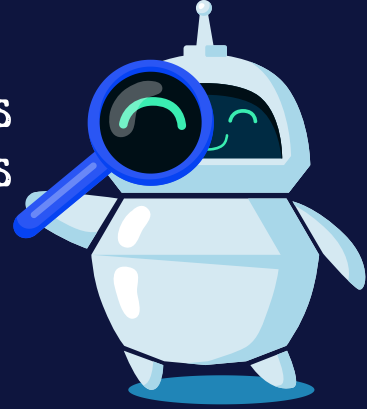
We don't always calculate every tiny detail-we often "see" the answer.

That ability is one of our greatest strengths

"This is where humans shine."



"THE MORE ACCESSIBLE WE MAKE MATH TO STUDENTS BY MAKING IT **VISUAL** AND **INTERACTIVE**, THE LESS ACCESSIBLE IT BECOMES TO **AI**."



1 WHY HUMANS THINK DIFFERENTLY

HUMANS CAN:

- Recognize patterns
- Adapt when conditions change
- Explain their thinking
- Learn from mistakes
- Solve unfamiliar problems creatively

Unlike humans, AI usually relies on patterns and information it has already been exposed to.

If a problem looks slightly different, it **may fail**.

This is why students can sometimes do better than even advanced AI when it comes to puzzles that require **creativity**, **visual thinking**, or **logic**.

2 MATH CLASS SHOULD BUILD THINKERS, NOT ROBOTS

OLD APPROACH

- Solve 20 similar questions.
- Memorize formulas.
- Repeat procedures.

But in the age of AI, this approach is no longer enough.

Why???

Because machines can already perform routine calculations faster than humans.



3 THIS IS WHY CLASSROOMS SHOULD FOCUS MORE ON:

- Visual reasoning
- Logic puzzles
- Group discussions
- Creative problem-solving
- Exploring multiple solution methods

THE GOAL OF MATH EDUCATION IS NO LONGER JUST GETTING THE CORRECT ANSWER.

It's **UNDERSTANDING WHY** the answer works.

What they can't do well is

CREATIVITY

LET'S PREPARE STUDENTS TO **THINK, CREATE, AND ADAPT**—BECAUSE THE FUTURE BELONGS TO **THINKERS**, NOT REPEATERS.

WHEN KIDS BEAT THE CODE



Teachers in Los Angeles Unified School District reported that students found word problems more difficult than visual ones. AI, however, performed the opposite—it solved word problems instantly but failed at visual puzzles.

This contrast suggests the need for educators to design tasks that emphasize human strengths. Human intelligence is deeply connected to visual understanding and intuition.

Interactive platforms like ST Math show how students thrive when challenged with visual reasoning. AI, trained on text and symbols, cannot replicate this experience.

The classroom becomes the arena where human creativity outshines machine calculation.



HUMANS

Struggle with word problems.



AI

Solves word problems instantly but fails at visual puzzles.



VS

THE REAL VICTORY

AI is powerful but limited. It thrives on symbols and rules but falters in visual and spatial reasoning

It can support learning, assist with calculations, and provide quick answers.
But it cannot replace human creativity.

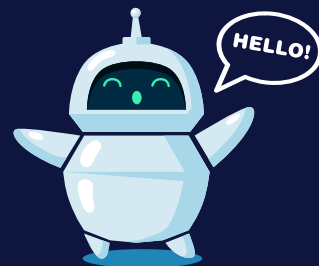
It cannot replicate intuition.

It cannot truly “understand” in the way humans do.

The future isn't about competing with AI.

It's about developing the **uniquely human skills** that machines can't copy:

- Creativity
- Critical thinking
- Adaptability
- Collaboration
- Imagination



FINAL THOUGHT

AI may be an incredible tool.

But tools do not replace thinkers.

The future belongs to people who can ask questions, recognize patterns, solve problems creatively, and think beyond algorithms.

And that's something no machine can fully replicate.

**BECAUSE IN THE BATTLE OF BRAINS VS BOTS, HUMANS
STILL HAVE THE GREATEST ADVANTAGE:**

the power to truly understand.

RIDDLE CORNER

1 WATER JUG DILEMMA

You are given an 8 gallon jug filled with water, and also two empty jugs: one that holds 5 gallons and another that holds 3 gallons. Using these three jugs, how can you measure exactly 4 gallons of water?



Answer: Fill the 5-gallon jug from the 8-gallon jug, leaving 3 gallons. Empty the 5-gallon jug, pour the 3 gallons into it, refill the 8-gallon jug, and pour into the 5-gallon jug until full. Exactly 4 gallons remain in the 8-gallon jug.



2 AMAZING EIGHTS

If you had to write down all of the whole numbers between 1 and 100, how many times would you have to write the number 8?

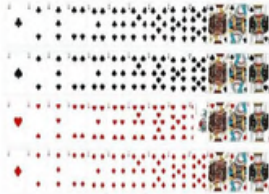


Answer: The digit 8 appears 20 times—10 in the ones place and 10 in the tens place.



3 MISSING CARDS

A few playing cards are missing from a standard 52-card deck. Three cards remain when you deal the entire deck to four people. And two cards remain when you deal the entire deck to three people OR if you deal the entire deck to five people.



How many cards are missing from the deck?

Answer: The deck has 47 cards, meaning 5 are missing.



4 THE FRUIT FACTOR

Each of the fruits in the digrams below are equal to one of the following whole numbers: 1 2 3 5

Find the value of each fruit so that both of the following would be true:

$$\begin{array}{r} \text{Apple} + \text{Apple} + \text{Lemon} \\ - \text{Grapes} + \text{Lemon} + \text{Lemon} \\ \hline \text{Apple} + \text{Lemon} + 0 \end{array} \quad \begin{array}{r} \text{Apple} + \text{Lemon} + \text{Green fruit} \\ - \text{Lemon} + \text{Lemon} + \text{Apple} \\ \hline \text{Lemon} + 0 + \text{Grapes} \end{array}$$

Answer:

- Grapes = 5
- Apple = 3
- Lemon = 2
- Green fruit = 1



AI may be the ultimate homework shortcut, but it cannot replace the human mind. The future of mathematics lies not in competing with machines but in embracing what makes us uniquely human—the ability to see patterns, to reason creatively, and to solve problems in ways that no algorithm can.

5

THE COMBO PLATTER

Oliver orders the combo platter for lunch every Wednesday.

One day, he noticed that the amount he paid for his sushi platter was a rearrangement of the digits of the amount of money he had in his pocket.

He also noticed that the money he had left over after paying was also a rearrangement of the same three digits.

How much money did Oliver start with?



Answer: Oliver started with 231. He paid 123 for the platter, leaving 108 — all rearrangements of the digits 1, 2, 3.



6

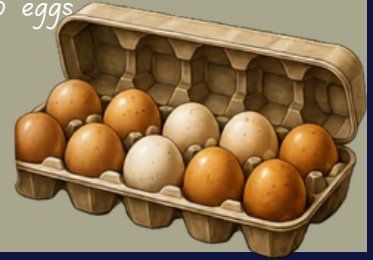
EXTRA EGGS

Jenny has ten chickens that lay eggs every day. She wants to give away her extra eggs to her neighbors, but she wants to give each neighbor an equal number of eggs. She figures out that she needs to give 7 of her neighbors eggs for them to get the same amount, otherwise there is one egg left over.



What is the smallest number of eggs she needs for this situation to be true?

Answer: Jenny needs 43 eggs.
Dividing 43 by 7 gives 6 eggs each with 1 left over.



7

THE FRUIT MAN

Mr. Baccigalupi sells and delivers crates of fruit from his grocery store to the people in his neighborhood. He can either put 8 large pieces of fruit or 10 small pieces of fruit into a crate. In one shipment, he sent a total of 96 pieces of fruit. If the number of large pieces of fruit is greater than the number of small pieces of fruit, how many crates of fruit did he deliver?



Answer: He delivered 12 crates — 8 crates of large fruits (64) and 4 crates of small fruits (32), totaling 96.



8

THE JUICED BASEBALL

You have 7 baseballs that all weigh the same except for one, which is lighter than the others.

Using a balance scale, how can you figure out which baseball is the lighter one if you only get **two chances** to weigh them?



Answer: First, weigh 3 balls against 3 balls.

- If they balance, the lighter ball is the 7th.
- If not, take the lighter group of 3 and weigh 1 against 1. The lighter one is found in just two weighings.



9

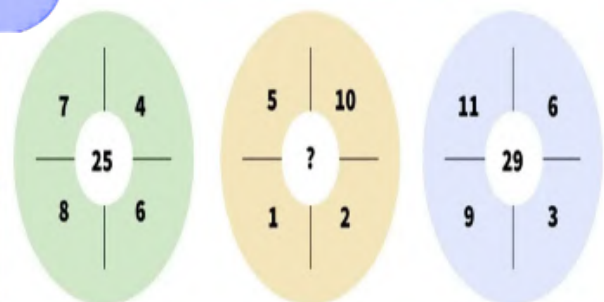
Find the Value

$$\begin{array}{rcl}
 \text{Computer} + \text{Computer} + \text{Computer} + \text{Computer} & = & 40 \\
 \text{Mouse} + \text{Mouse} + \text{Mouse} + \text{Computer} & = & 16 \\
 \text{Keyboard} + \text{Computer} + \text{Keyboard} + \text{Mouse} & = & 18 \\
 \text{Computer} + \text{Keyboard} + \text{Mouse} + \text{Mouse} & = & ?
 \end{array}$$

Answers: Just add all values: {Computer = 10, Mouse = 2, and Keyboard = 3} Computer + Keyboard + Mouse + Mouse $10 + 3 + 2 + 2 = 17$

10

Find the value



Answer: Circle = 5, 10, 1, 2 Add them : $5 + 10 + 1 + 2 = 18$ So the missing value is 18.

SOCIAL MEDIA POSTS

POST 1 - CHALLENGE STYLE

CAPTION HOOK:

🤖 vs 🧑 **Who wins?**

AI can solve calculus in seconds but fails at this riddle:
Oliver picks 44 kiwis on Friday and 58 on Saturday. On Sunday, he picks double Friday's amount. How many kiwis does he have?



HASHTAGS:

#AlvsHuman #MathChallenge
#Riddle #LogicPuzzle #DieHardMath

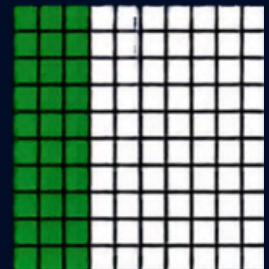
POST 2 - VISUAL PUZZLE

CAPTION HOOK:

AI saw "4 Stripes" when there were only 3.

Humans always spotted the pattern 3/10 shaded.

Can YOU see it??



HASHTAGS:

#AlvsHuman #VisualMath
#PatternRecognition #MathGames

POST 3 - RIDDLE ENGAGEMENT

CAPTION HOOK:

Featured in Die Hardly 2!

You have jugs of 8, 5, and 3 gallons. How do you measure exactly 4 gallons?
AI struggled. Can you solve it?

HASHTAGS:

#MathRiddle #AIChallenge
#DieHardMath #LogicPuzzle



POST 4 - FUN FACT

CAPTION HOOK:

AI loves symbols.

In a puzzle about rotating a penguin, it ignored the task and wrote a biography of Isaac Newton instead.



HASHTAGS:

#AlvsHuman #MathFails
#CreativeReasoning #FunMath



CONCLUSION

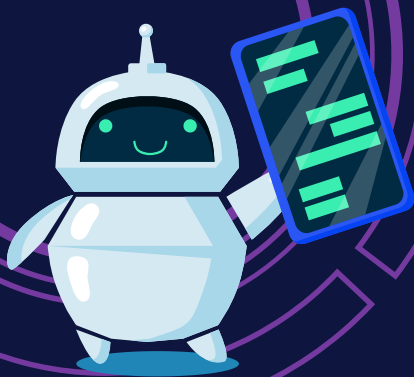
Artificial Intelligence has undoubtedly transformed the way we solve problems, learn, and interact with technology. Its ability to process massive amounts of information and solve complex calculations is remarkable. However, as we have seen, AI still struggles with tasks that require creativity, visual understanding, logical flexibility, and real reasoning.

This comparison between humans and machines reminds us that intelligence is not only about speed or accuracy. True intelligence also involves curiosity, imagination, pattern recognition, and the ability to think differently when faced with new challenges.

The future of mathematics and education is not about humans competing with AI, but about using AI as a helpful tool while continuing to strengthen the uniquely human abilities that no machine can fully replace.

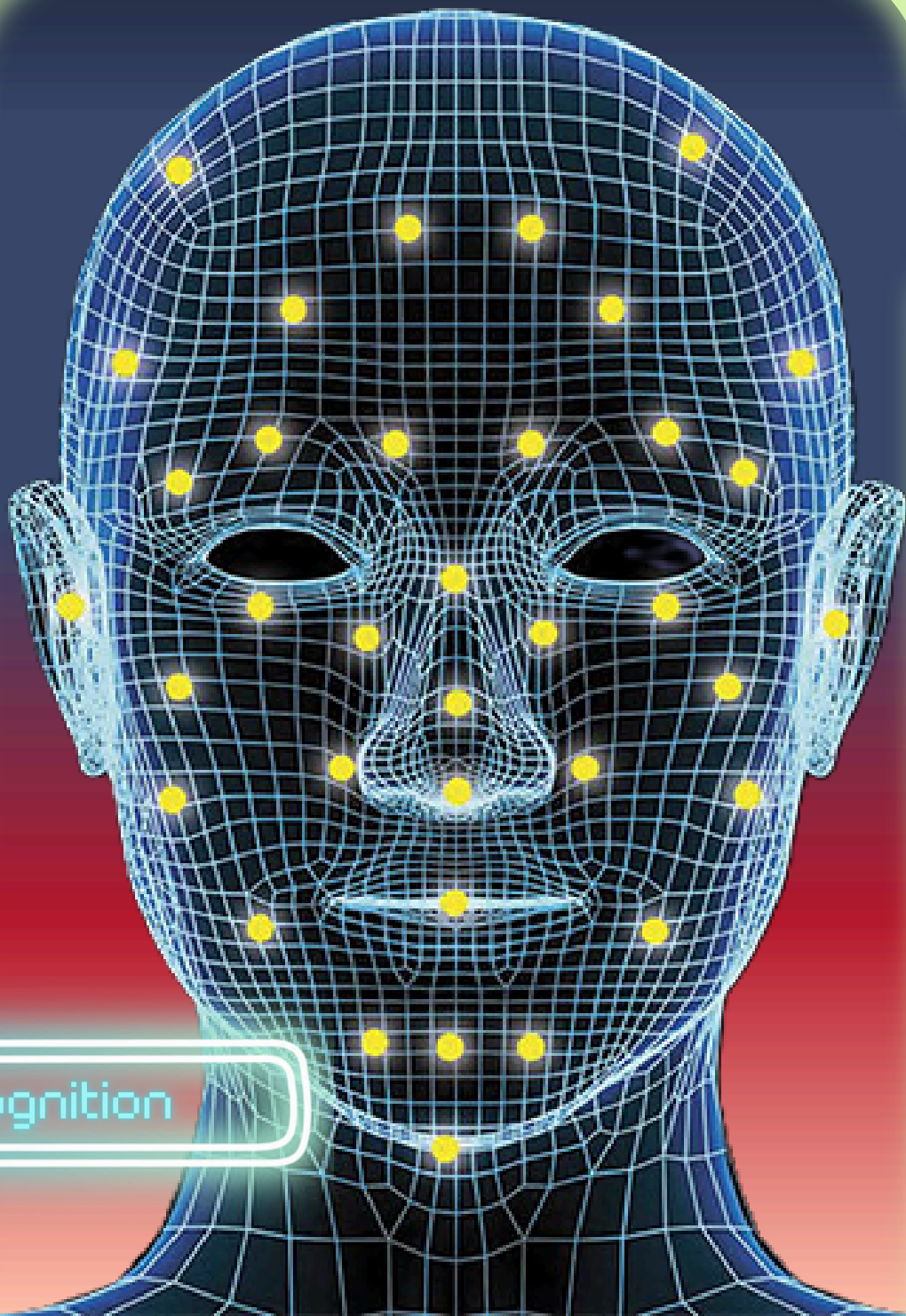
IN THE END, WHILE AI MAY CALCULATE FASTER, HUMANS STILL LEAD WHERE IT MATTERS MOST — UNDERSTANDING, CREATIVITY, AND CRITICAL THINKING.

THAT IS WHAT MAKES THE HUMAN MIND TRULY POWERFUL.



Section 9

Mathematics+Ai and Daily life



Face Recognition

THE HIDDEN LOGIC:

HOW MATHEMATICS POWERS THE AI IN YOUR POCKET

We typically visualize Artificial Intelligence as some sort of human like brain filled with some magical intuition but when you remove the sleek software of your favorite applications, what you really find is a giant, intricate, spider like web of Mathematics.



From unlocking your phone with your face, to your car's ability to compute the best route in rush hour traffic, math is the unsung hero behind everything smart in our world. What has once been considered merely an academic pursuit has truly manifested as a real world phenomenon, it is the building blocks for every calculated intelligent step that a machine takes.

Mathematics is the language that can decode the chaos that is human behavior and translate it into meaningful, quantifiable data. Without algebra, statistics and calculus, the AI revolution will remain an unreachable myth. However, it is no longer the world of science fiction, it is a concrete reality surrounding us.



The Digital Matchmaker: Streaming and Social Media

The seemingly impossible accuracy of your Netflix recommendations or your Instagram explore feed are actually the end result of complicated Linear Algebra. These recommendations are produced by something called matrix factorization.

You can imagine a massive grid where each row represents you, or another user, and each column represents an item like a movie, song or photograph. Since no one can watch every single item available it means that majority of these entries will be null. Using vectors—these objects in math that have both direction and magnitude, the system determines what your tastes are, maps your vectors on a multi-dimensional space, and calculates their dot product, or simply their mathematical distance from a particular new show.

This calculation isn't about just one aspect but about human perception and feelings that are all mapped and interpreted in the form of numbers. When a suggested show gets a 90% match, it's actually the calculation of a massive algebraic equation that aligns the dots of your life online to those of millions of other users, providing them with the relevant content that they need and want in the endlessness of the digital world. So, next time when you look at Netflix or your Instagram explore page you'll know it exactly matches your favorite.





The Master Navigator:

Real-Time Routing

Never hitting traffic on the freeway is thanks to a combination of Graph Theory and Probability. Instead of mapping your journey as you know it, Google Maps or similar systems convert the world into a giant Graph. Nodes in this graph represent junctions in the road, and edges connect them and they are given a numeric weight depending on how busy that stretch of road is.



Every time you plot a journey you effectively present your route as a problem of finding the shortest path and using an algorithm such as Dijkstra's, the system will process billions of combinations of routes and pick out the fastest one based on these values. But this is more than just distance, as it is calculated through Bayesian probability and it determines how likely a route is to become blocked up at a certain point. By calculating the speed of the thousands of other cars, you have the potential to be redirected just before you encounter any congestion-it's about analyzing statistical odds and creating the most efficient route in real-time.

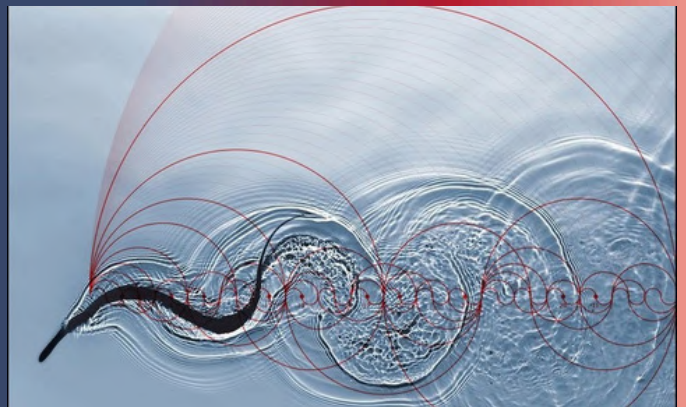


The Invisible Shield:

Prime Numbers and Security

Beyond the entertaining sides of life we live and see every day mathematics also has another crucial role; protecting it. Every time you log in to a service with a password, make a transaction online, or even send an encrypted email, the foundation behind your digital privacy lies within Number Theory, an ancient and sophisticated mathematical discipline. RSA encryption, the foundation for online security, depends on a trapdoor function, a mathematical equation that is incredibly easy to solve in one direction, yet practically impossible to solve in the reverse direction without some piece of information- a key.

Multiplying two enormous prime numbers together is simple for a computer; however, if given the resulting number, factoring it back into the original two primes would theoretically take billions of years on the strongest of supercomputers! This is where the movie, "Prime Target" finds its dramatic tension, the idea that some purely mathematical functions are practically unsolvable forms the backbone of our digital safety.



THE FOUNDATION OF THE FUTURE

Ultimately, the building blocks of machine learning can be simplified to Statistics and Calculus. While Linear Algebra provides the structure, Calculus provides the movement and action, using derivatives known as gradient descent to figure out how to reduce the error in a system. Whether it's teaching a doctor to identify a tiny anomaly in a scan based on its statistical difference to what is teaching voice assistants to recognize particular accents through wave patterns, math is what's making it all work. It seems that instead of hiding in textbooks, math is becoming the key element to how we live our lives and how we secure our digital world and the intelligence systems within it are a direct result of the continuous, elegant motion of mathematical processes.

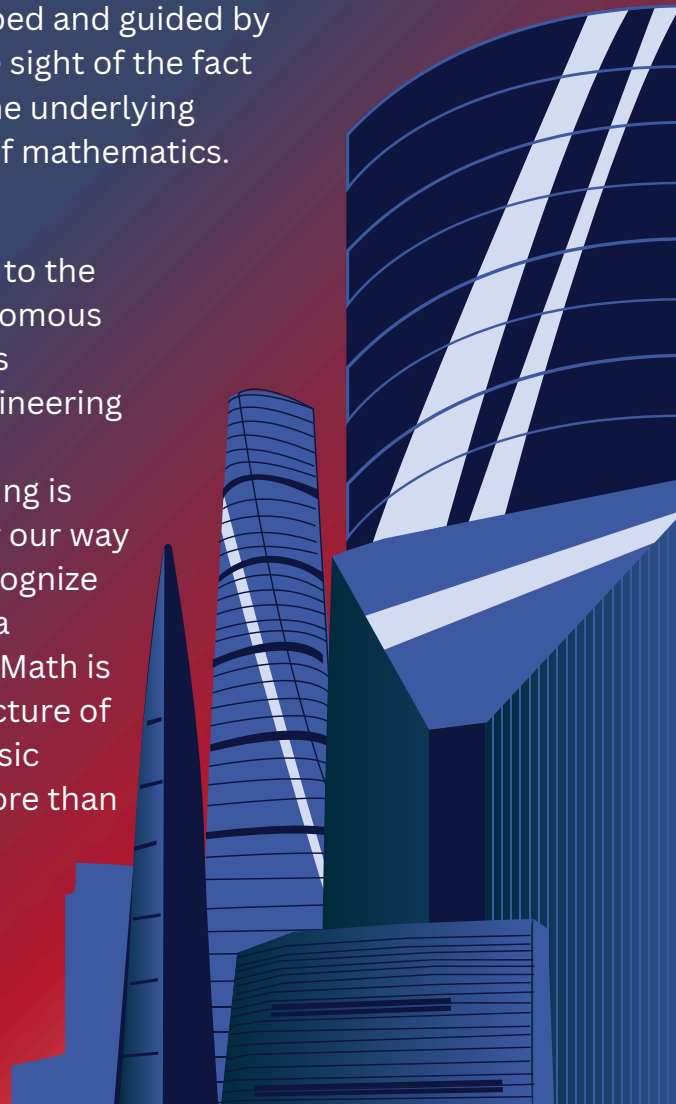
CONCLUSION

The Math Horizon: So What's the Big Deal with This Synergy?

Ultimately, the merging of Mathematics and AI will go down as one of the most significant paradigm shifts in the history of humankind. Mathematics has often been perceived as a static entity, the subject of our classroom learning, now tucked away in our cerebral closets. Yet now, in the capable hands of AI, it is a vibrant, living, breathing force. From a language of calculation it has become a language of 'thought'. We've seen how every movie we watch, every road we travel, and the security of our entire digital world all relies on equations performing calculations, silently, invisibly, beneath the surface of everyday life. But this synergy does far more than create smartphones, it offers us an arena for problem-solving previously thought to be beyond our capacity, from predicting shifts in global climate to designing, with an unassailable velocity, drugs that save human lives.

As we venture into the future, it seems the distinction between human intuition and calculation will continue to blur, creating a landscape where our perception of reality is shaped and guided by algorithms. However, it is important to never lose sight of the fact that, although AI supplies the scale and speed, the underlying truth rests with the inherent, timeless elegance of mathematics.

From the idea of prime numbers in 'Prime Target' to the sophisticated calculus underpinning every autonomous vehicle's decision-making process, the message is irrefutable: the digital age is not a triumph of engineering alone, but a masterpiece of mathematical implementation. By understanding 'why' something is happening, we can begin to effectively maneuver our way through this algorithm-driven landscape, and recognize that every click, every swipe and every search is a monument to the eternal power of the equation. Math is no longer a subject to be studied, it's the architecture of the future. Yet, it is still the beginning or just a basic example of what AI can do, Math can do much more than this with the help of AI.



SECTION

10

Departmental Overview



ALUMNA SPACE



Shreya Mishra -2020'

Heyyy!!!

Currently, I am pursuing MBA at NSUT and heading up for summer internship.

As an alumna of Bharati College, University of Delhi (2020 batch), I would like to share a few thoughts about my journey. Our first semester was in online mode we made friends in online mode only, and were very excited to see and experience our college life. Bharati College gave me a platform to explore my own skills. From being the Vice president of The Exponents' to organising numerous events everything still has a place in my heart. The friendship we developed are for lifelong.

I would like to express my heartfelt gratitude to Anubha ma'am, Meenakshi ma'am and Ankit sir for their constant guidance and support throughout my journey. BEST WISHES !!!



Jyoti Rajpoot -2021'

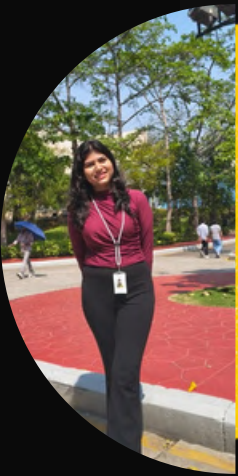
Currently, I am working as a Specialist programmer at Infosys limited and completed my Master of computer application from NIT Raipur

As an alumna of Bharati college University of Delhi (2021 batch), I feel extremely grateful for the beautiful journey, learning experiences, and memories I gained here.

One thing I will always admire about our college and department is the dedication and support of our professors. I would especially like to express my heartfelt gratitude to Ankit Sir ,Anuj sir and Meenakshi Ma'am for their constant guidance and encouragement. Sir was always ready to solve our doubts anytime, even after college hours, which truly motivated us to learn better and never hesitate to ask questions. Such dedication and support from teachers made a huge difference in our academic journey.

All the professors were extremely supportive, hardworking, and genuinely concerned about the growth and future of their students. Their efforts, guidance, and belief in us helped shape our confidence and career paths.

I feel proud to be associated with Bharati college and I sincerely wish great success and bright futures to all the students. BEST WISHES!!!



Pariksha gaur - 2023'

My journey as a B.Sc. Mathematics (Hons.) student at Bharati College was unconventional. With the lockdown pushing half my college life online, my remaining time was spent differently than I had imagined. I wasn't always in class; instead, my fondest memories involve exploring Delhi alone, observing people, and learning about myself during long metro rides.

At the time, I feared I was missing the "ideal" college experience. Now, I see that growth happens beyond classrooms—in moments of solitude, confusion, and newfound independence.

Today, I work as an Assistant Section Officer in the Central Secretariat Service under the Ministry of Home Affairs. My path taught me you don't need a conventional route to reach a meaningful destination.

To my juniors: don't panic if life feels unsorted. Keep moving forward, stay curious, and trust your unique journey. Live college your own way, because the best memories are often unplanned.



ALUMNA SPACE

“



Deepali -2023'

Heyyy

Currently, I am working as a Curriculum Developer at Sri Aurobindo Society.

As an alumna of Bharati College, University of Delhi (2020 batch), I would like to share a few thoughts about my journey. Being part of the COVID batch, our college experience was a blend of both online and offline learning, which made it slightly different yet full of unique memories. I still remember how excited I was to explore my college life. Bharati College truly gave me the wings to fly and grow, both personally and academically. I also made many friends here who are truly gems and will always be special to me.

I would like to express my heartfelt gratitude to Anubha ma'am, Meenakshi ma'am and Ankit sir for their constant guidance and support throughout my journey.

BEST WISHES!



”

”

Kajal- 2023'

After graduation, I pursued an MBA in Finance and now I'm working at [ALL EURO CAR PARTS], an Australian MNC. Honestly, the journey was full of assignments, stress, rejections, overthinking, and lots of "what am I even doing with my life?" moments — but things finally worked out!

College taught me patience, confidence, and how to survive deadlines with minimal sleep. A special thanks to Anubha Ma'am, Ankit Sir, and of course Pooja Ma'am — amazing teachers who always supported and motivated me throughout my journey.

My message to students: "Trust the process, work hard, and don't panic — life eventually figures itself out."

Thank you!



“

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Sanjana Nayak- 2025'

Current Role: Consultant at ISDRR and B.Ed. Student at GGSIPU

As an alumna of Bharati College, I feel immense gratitude for the beautiful journey that shaped me. College life was truly unforgettable—from making memories at fests and bunking classes to scoring zero on tests and still somehow making it through! Those moments were not just fun; they prepared us for real-life challenges, teaching us resilience, adaptability, and confidence. Looking back, I realize that college quietly molds you into your future self.

My message to all students: explore as much as you can and never miss an opportunity. Participate, learn, fail, grow, and enjoy every single moment. After three years, you will look back and be amazed at how much you have evolved.



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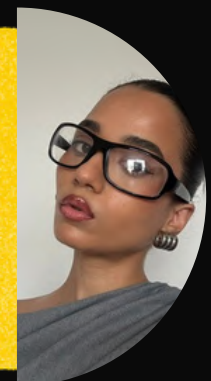
Shreya Gupta 2019'

I am Shreya Gupta, an alumna of Bharati College, University of Delhi, batch of 2019. After college, I started working as a UGC creator, creating content and collaborating with brands, which also led to modelling opportunities along the way. Right now, I'm focused on building my own space on Instagram (@shreyaa.guptaaaa).

What started as simply posting online slowly turned into something much bigger. Like many students, I also had doubts about what I was going to do next. But over time, I realised that growth often begins the moment you stop waiting to feel "ready" and start showing up as yourself.

To every student reading this: trust yourself a little more, try new things, and don't be afraid to start small. You never know where one opportunity, one idea, or even one post can take you.

I'll always be grateful for the memories, people, and experiences I got during my time at the department.

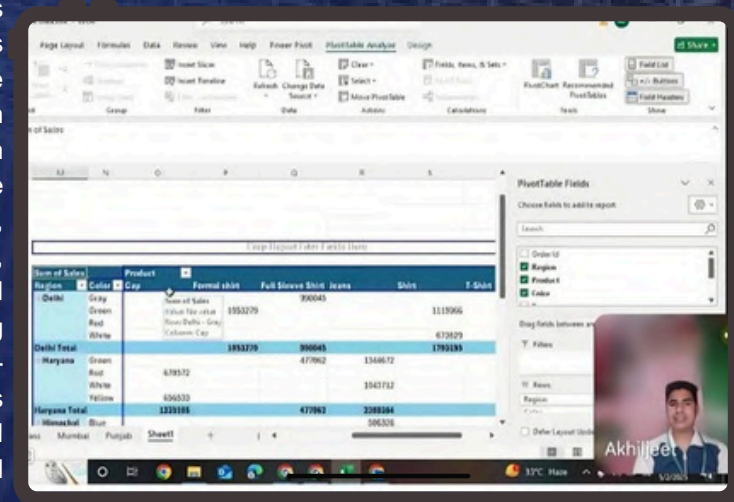


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Advance Excel and Power BI Course

The Department of Mathematics, through its student society The Exponents has successfully conducted two batches of the Advance Excel and Power BI certificate course in collaboration with Anudip Foundation. Batch-1 started on 28th March 2025 (offline) and continued online from 29th April 2025, while Batch-2 began on 13th October 2025 in online mode. Both batches ran for 45 hours (23 classes of 2 hours each). Batch-1 had approximately 100 registered students among which over 60 students were regularly attending the sessions and Batch-2 had around 40 students per class from various colleges across Delhi. The comprehensive curriculum took learners from beginner to advanced level, covering the entire data lifecycle including data cleaning, filtering, validation, advanced Excel functions (LOOKUP, Pivot Tables), and Power BI for creating interactive dashboards and visualizations. Students developed strong analytical thinking and the ability to derive meaningful insights and support data-driven decision making. By the end of the program, students who had successfully achieved the eligibility criteria required their certificates. Also, some final year students received internship and placement opportunities as well.



Everyday AI with LLMs (Seminar)

By-Dr. Vishnu Shankar

On 16th October 2025, the Department of Mathematics organized a seminar titled “Everyday AI with LLMs” under The Exponents. The session was delivered by Dr. Vishnu Shankar- Assistant Professor, DDUC College, University of Delhi in the Seminar Room. The seminar introduced students to the fundamentals of Large Language Models(LLMs) and placed strong emphasis on Prompt Engineering. Participants learned key concepts such as effective prompting and few-shot (3-shot) prompting techniques. Through interactive activities, students gained hands-on experience with modern generative AI tools including Suno AI, Perplexity.ai, and Gemini. The session successfully built a foundational understanding of how LLMs function and how prompt engineering can significantly enhance AI outputs, while also highlighting creative and practical applications of AI in academic and professional contexts.



WORKSHOP ON RESEARCH METHODOLOGY

By-Dr. Gunjan Khurana

On November 18, 2025, the Department of Mathematics, under The Exponents, held a workshop on "Research Methodology" with a focus on writing dissertations. Dr. Gunjan Khurana, an Associate Professor from Indraprastha College for Women, led the session. The workshop showed the organized way to approach academic work and dug into the main parts of doing research. It gave a clear picture of the whole dissertation process, from explaining it as a formal piece of work to its role in showing off research and analysis skills. Attendees learned about the usual setup of a dissertation with sections like the introduction, literature review, methods, results, analysis, and conclusion. The session also guided students on important academic practices like citing sources in APA, MLA, and AMS styles and the role of journal impact factors in selecting references. Additionally, Dr. Khurana explained the evaluation criteria of the University of Delhi-focusing on clarity, originality, and organization-and introduced tools like Turnitin to check for plagiarism, ensuring work integrity. Conclusion: The workshop on Research Methodology for Dissertation Writing offered useful information about the steps in good research and academic writing. Dr. Gunjan Khurana covered important topics like structuring dissertations, citing sources correctly, evaluation standards, and checking for originality, giving students the tools they need to handle academic projects. The session's interactive style helped clear doubts and provided a solid base for future research efforts.



Creating Diverse Job Opportunities across the AI Value Chain (Seminar)

BV- Kartik Goel

On 16th February 2026, the Department of Mathematics conducted a seminar on "Creating Diverse Job Opportunities across the AI Value Chain" as part of the Pre-Summit Activities for AI Summit 2026. The session was delivered by Kartik Goel who has been teaching AI for over 5 years now to students and IT professionals. The session highlighted India's rapidly expanding AI ecosystem and explored the deep intersection of AI with Mathematics in domains such as data science, machine learning, automation, fintech, healthcare, public policy, and governance. It provided a comprehensive overview of the complete AI value chain, from data collection and preprocessing to model deployment and ethical auditing. Participants gained clarity on emerging career pathways including AI Engineering, AI Ethics Consulting, Data Analytics, Research, and Policy Advisory roles. The seminar helped students identify essential skills like mathematical modelling, statistical reasoning, programming, prompt engineering, and ethical awareness, while encouraging them to map their academic and professional journeys in the AI domain.



XPONENTIA'26

DEBATE COMPETITION

The Debate Competition focused on "Use of AI and Its Impact on Mathematical Learning" was held on 16 February 2026. It featured ten participants engaging in a lively discussion, presenting well-researched arguments. Throughout the event, students explored how artificial intelligence affects education, using data and expert views to boost their critical thinking, public speaking, and ethical reasoning. The judges had a really hard time picking the winners since each speaker showed a great understanding of technology and teaching. To celebrate their dedication and effort in this modern discussion, all participants got formal e-certificates.

WINNER:- Harsh Nath Jha
RUNNER UP:- Ritesh Dongre
BEST INTERJECTION :- Anshika Jha



QUIZ COMPETITION

A quiz Competition was also held on the theme of "General AI and Mathematics Integration". The event featured fast-paced, timed 3 rounds with difficulty level increasing after each level. It was full of challenging problems that required five eager teams to show both their AI knowledge and their skill in using math on the spot. The energy in the room was thrilling as the competition stayed close, making it tough for the organizers to rank such talented participants. More than the rankings, the event encouraged cross-disciplinary thinking and important time-management skills, finishing with awards for the winners and e-certificates for everyone who took part.

FIRST POSITION:- Chirag
SECOND POSITION :- Badal Kumar Singh & Dinesh
THIRD POSITION:- Danveer & Pushkar



XPONENTIA'26

PHOTOGRAPHY COMPETITION

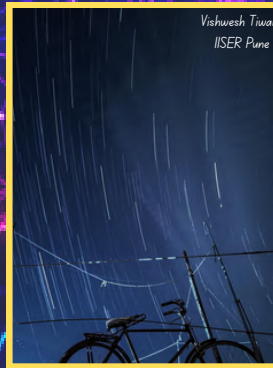
“The AI-Assisted versus Manual Creativity” photography Competition took place in online mode which was also a part of the annual fest based on the same theme as the fest. Students from different colleges participated, submitting work that included two photographs, one tech-driven and another traditional photography. They also focused on visual storytelling, composition, and ethical aspects. Seven participants shared their creative projects. E-certificates were given to all the participants.

FIRST POSITION:- Mitali Raj

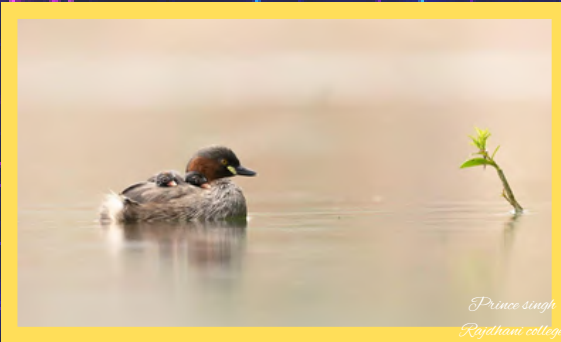
SECOND POSITION :- Sneha



By Sushant Singh



Vishwesh Tiwari
IISER Pune



Prince Singh
Rajdhani College

DIGITAL-ART COMPETITION

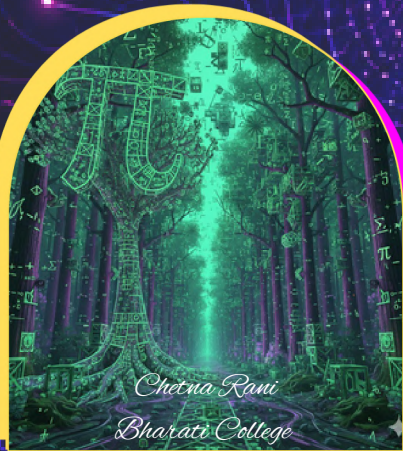
On 16 February 2026, the Digital-Art Competition themed “Using Efficient AI Prompts” was organized by The Exponents. Participants engaged in logo-making using AI-assisted design tools while focusing on branding principles, accessibility, and originality. The competition witnessed enthusiastic participation from 5 students who demonstrated creativity through effective prompt engineering and iterative design. The event enhanced students’ design thinking, technical skills, and awareness of ethical AI usage in digital art. Winners received prizes and all participants were given e-certificates.

FIRST POSITION:- Sneha Aggarwal

SECOND POSITION :- Harleen Kaur

THIRD POSITION:- Maninder Kaur

For more digital
Art please refer



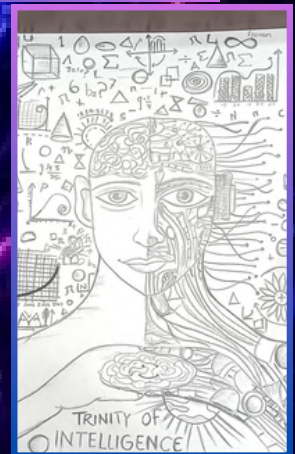
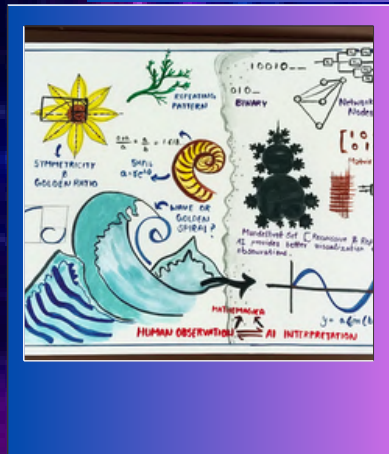
Chetna Rani
Bharati College



Sneha Aggarwal
Bharati College

SKETCHING COMPETITION

THIRD POSITION:- Anamika

[illegible]

THIRD POSITION:- Maninder

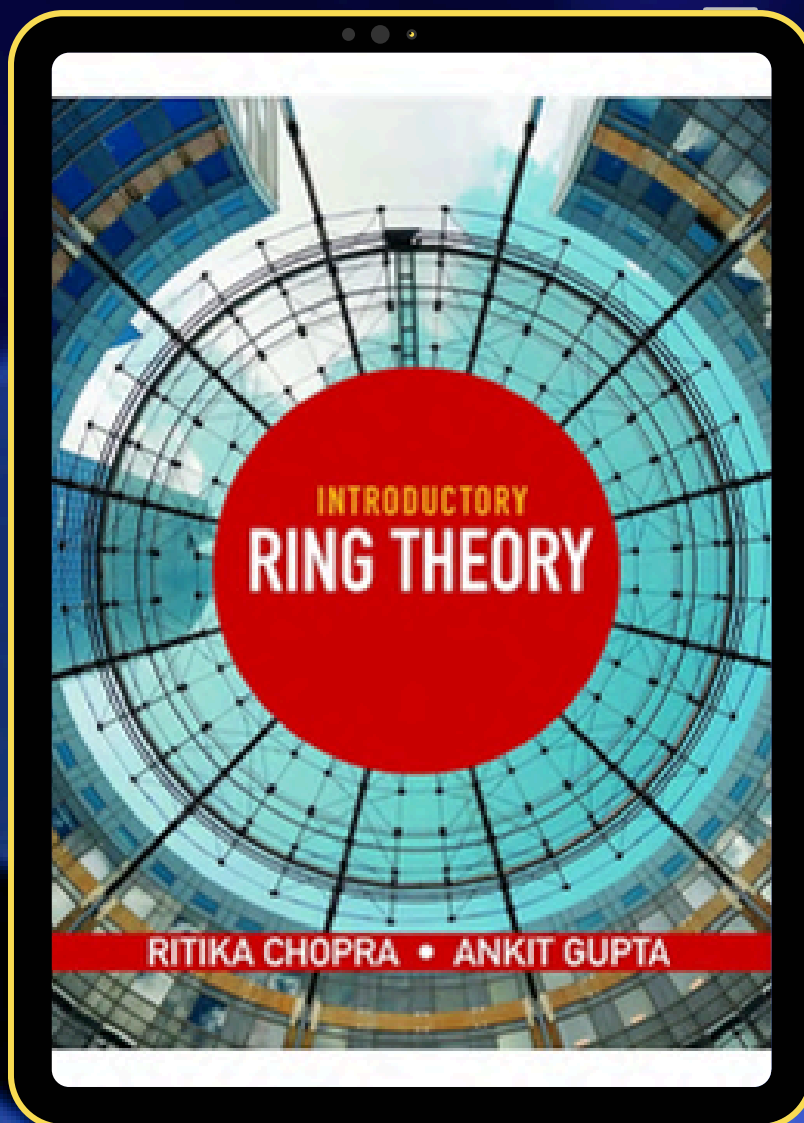


Achievements

DR. ANKIT GUPTA

We are proud to share that our respected faculty member has co-authored the book *Introductory Ring Theory*, published by Cambridge University Press^[OBU] in 2026. The book presents the fundamental concepts of ring theory in a clear and student-friendly manner, making abstract algebra more accessible to undergraduate learners. It covers important topics such as rings, ideals, homomorphisms, integral domains, and polynomial rings, along with practical examples and applications.

This achievement reflects his dedication towards academic excellence, research, and quality education in the field of mathematics.



S. NO.	Name	Year	Event	Position	Venue
1	Anoushka Chowdhury	4th	Gandhipreneurs 2.0		Satyagrah Hall, Gandhi Darshan, Rajghat, New Delhi
			Social Ideathon Competition at DBE.	Finalist	University of Delhi, South Campus
			JIMS Prastuti Competition	First runner up	JIMS Rohini
2	Rani Saundik	4th	Social Ideathon Competition at DBE.	Finalist	University of Delhi, South campus
3	Anshika Jha	3rd	Utkarsh Civil Services Summit Mock UPSC by Study IQ IAS	Rank 2	Bharati College, University Of Delhi
			Young Achiever's Award		Government of Delhi
			Served as Judge for the Flagship Debate		Lady Hardinge Medical College, Delhi
			Shaheed A.S.Dalal Memorial Debate Competition		KMC, University of Delhi
			Conventional Debate	1st Position	Kirori Mal College, University of Delhi
			Speech competition	1st Position	Shaheed Bhagat Singh college
			Conventional Debate	1st Position	Lady irwin college
			Conventional Debate	1st Position	Gandhi study circle in collaboration with Hestia- Dept of Sociology.
			Polivox Loksamwad debate	1st Position	Bharati College
			Poetry Competition	1st Position	Bharati College

S. NO.	Name	Year	Event	Position	Venue
4	Neha	2nd	DANCE COMPETITION INTERCOLLEGE (NCC)	1st Position	RAMJAS COLLEGE NCC
				1st Position	VENKATESHWAR COLLEGE NCC
5	Tripti	2nd	Quarter Guard	1st Position	Delhi Technological University
			Tug of War	1st Position	Delhi Technological University
			Quarter Guard	1st Position	Maharaja Agrasen Institute of Technology
			Tug of War	1st Position	Maharaja Agrasen Institute of Technology
			Quarter Guard	Runner Up	Aryabhata College
			Quarter Guard	1st Position	Sri Guru Tegh Bahadur Khalsa College
			Quarter Guard	1st Position	Shyam Lal College
6	Mitali Raj	2nd	Bharati Cup(Hockey)	2nd Position	Bharati College, University Of Delhi
7	Anjali Kumari	2nd	Bharati Cup(Hockey)	2nd Position	Bharati College, University Of Delhi

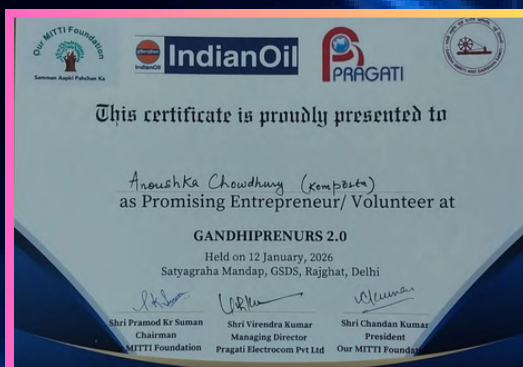
S. NO.	Name	Year	Event	Position	Venue
8	Adimayee	1st	Vikshit Bharat Youth Parliament(District Level)	9th position	Bharati Vidyapeeth's College of Engineering, New Delhi
9	Anshu	1st	NCC (Volleyball)	1st Position	Sharda University
				1st Runner-Up	Bharti College
				2nd Runner-Up	South West District
10	Yashmeet	1st	Mix Media painting	1st Position	dayal singh college
			Undead skin-face painting	1st Position	dayal singh college
			Surrealism painting	3rd Position	IIT kanpur
			Japanese quilling and origami	3rd Position	IIT kanpur
			Chloro Canvas- leaf painting	1st Position	Lady Irwin
			Raffle your art	1st Position	Bharati college
			Poster making	3rd Position	dayal singh college
			Tshirt painting	3rd Position	dayal singh college
			Sensu-fan painting	3rd Position	sri guru gobind singh
			Colour of equity	3rd Position	Bharati college

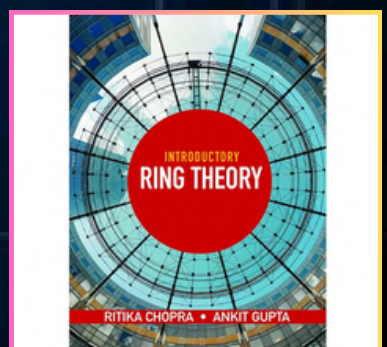
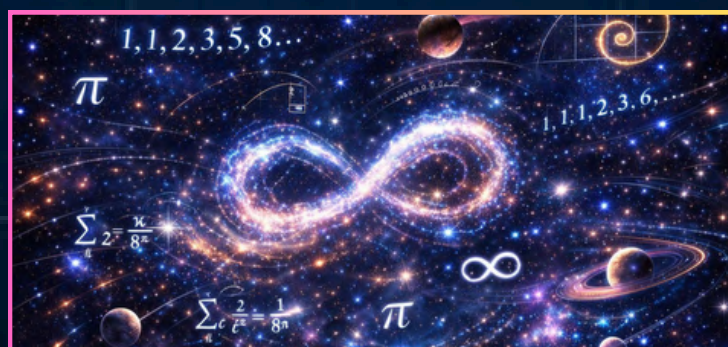
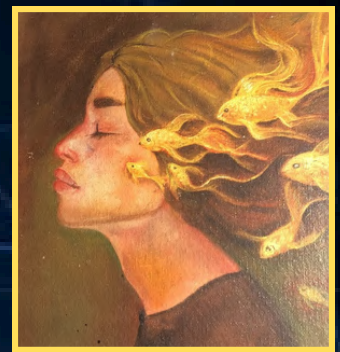


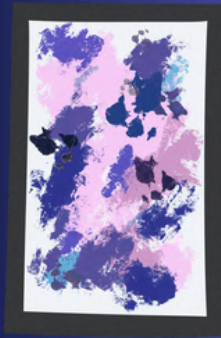
Achievements collage



$$\sum_{k=1}^n \frac{1}{f(k) - f(2k)} > \frac{27f(1) - f(n)}{4f(1) - f(1)}$$





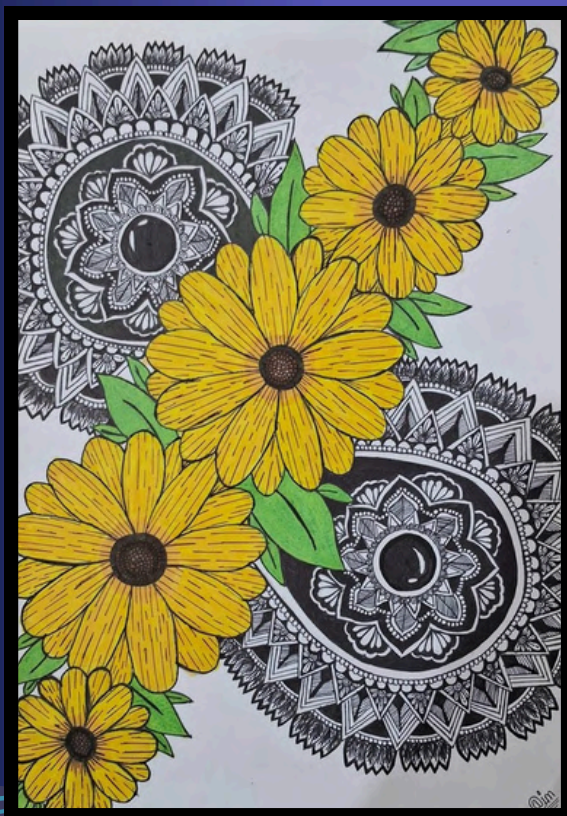


ART WORK

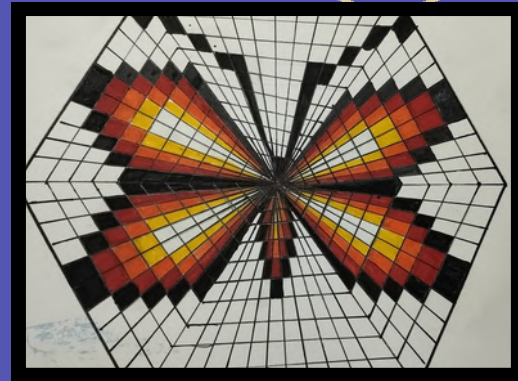
Yashmeet (Sem2)



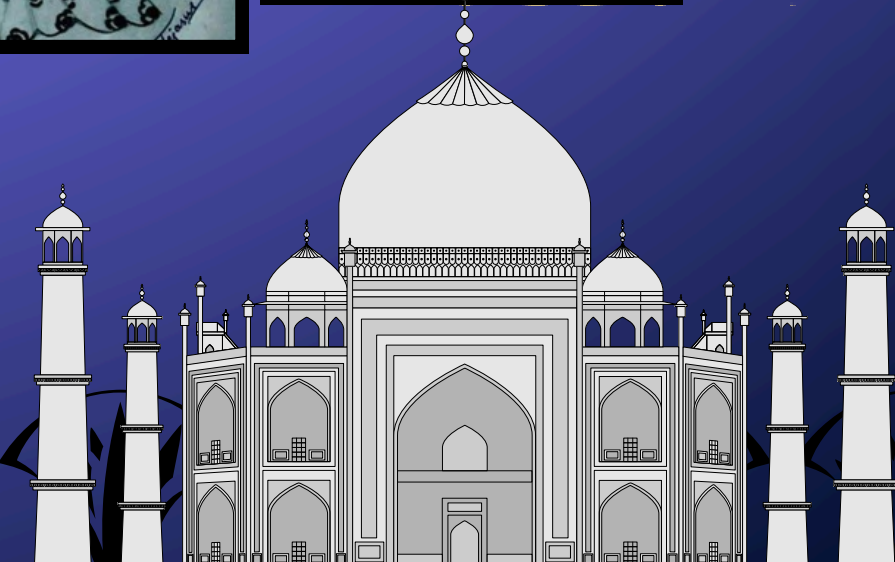
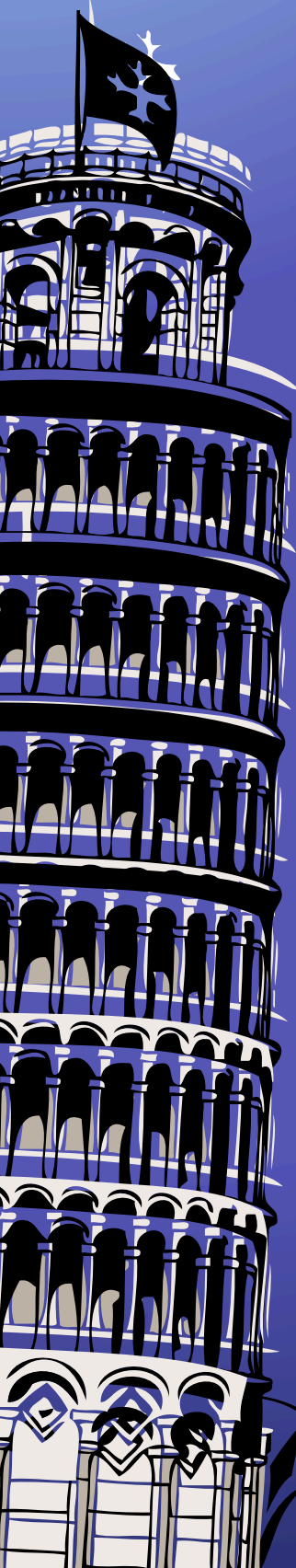
Adimayee Itishree Muktima Behura (Sem2)



Priya Yadav (sem 4)



Tejaswi



The Great Ladyfinger Scam

This dates back to the days when I was an innocent little kid in first grade. My heart was tender, and the world was very colorful. One day, our dear (and perhaps a bit strict) drawing teacher made a 'historic' announcement: "Children! Tomorrow, everyone will bring a ladyfinger print! This is your homework!"

The entire class was filled with excitement. After reaching home, I narrated this decree to my 'great' father. My father? Oh, he's a bit 'bidu' (quirky), a bit of a 'donkey' (affectionately!), and above all, a first-class 'joker'.

He listened to me, nodded his head, and sank into deep thought. Then, a mischievous glint appeared in his eyes.

The next day, my preparations for school began. I was very excited because I had something that no one else had: 'real art'!

When I reached school and showed my 'masterpiece' to my drawing teacher, what happened next became etched in the pages of history.

I proudly opened my notebook. There was no color in it, no design; instead, the real sliced head of a fresh, green ladyfinger brought from the market was stuck there with glue!

The teacher first looked at the notebook, then looked at me, then looked at the ladyfinger. For a moment, there was silence. Then suddenly...

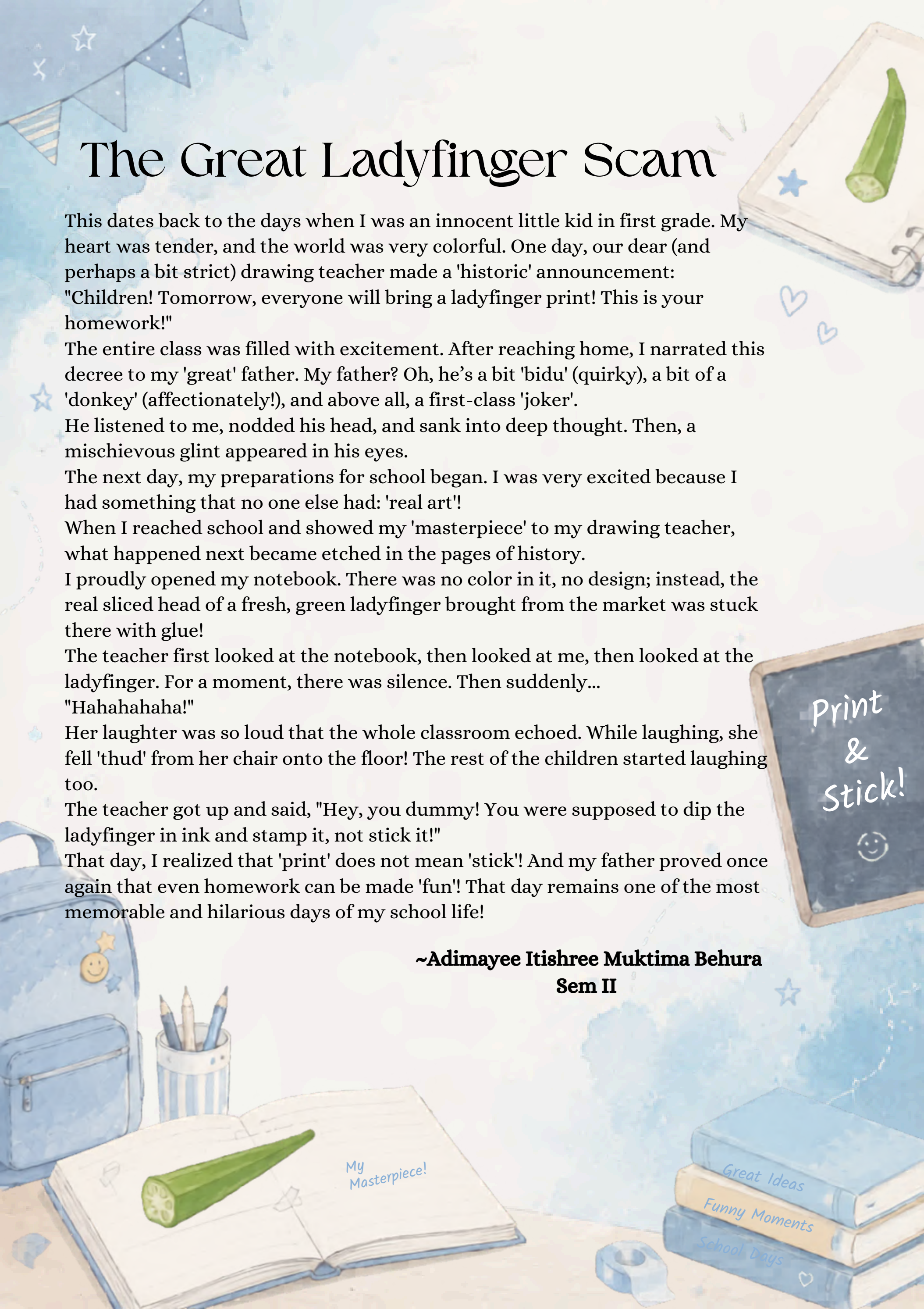
"Hahahahaha!"

Her laughter was so loud that the whole classroom echoed. While laughing, she fell 'thud' from her chair onto the floor! The rest of the children started laughing too.

The teacher got up and said, "Hey, you dummy! You were supposed to dip the ladyfinger in ink and stamp it, not stick it!"

That day, I realized that 'print' does not mean 'stick'! And my father proved once again that even homework can be made 'fun'! That day remains one of the most memorable and hilarious days of my school life!

**~Adimayee Itishree Muktima Behura
Sem II**



हो रही लड़कियां शिकार बढ़ रहा बलात्कार।



Prachi Goyal

Posted 14 August 2024

हो रहा है लड़कियों का जीवन दुश्वार,
क्योंकि हो रही है,
वह हर दिन रेप का शिकार।

यूं तो हर घंटे उनके साथ हैवानियत हो रही है,
और
सरकार हाथ पर हाथ धरे बैठ हुई है।

ना तो उस निर्दोषी को इंसाफ दिला रही है,
और
ना ही उसे दोषी को सजा सुना रही है।

यूं तो अपने आप को मर्द कहने पर बहुत इतराते हो,
और
फिर खुद ही हैवानियत दिखाकर नामर्द बन जाते हो।

अपनी हवस मिटाने को लड़कियों को बक्श नहीं रहे हो,
और
जब उनके साथ हैवानियत हो जाती है,
तो फिर उन्हें जीने नहीं दे रहे हो।

अरे! क्या बच्ची हो या जवान?
हर किसी के साथ हैवानियत दिखा रहे हो।

हर समय हर पल,
तुम हर लड़की से उसकी इज्जत छीन रहे हो,
कर रहे तुम उसकी इज्जत नीलाम बाजारों में,
और
सोच रहे हो अपने को मर्द की दिखाई,
मैंने अपनी मर्दानी एक औरत पर।

बन रहे तुम पाप के भागीदार हो,
अरे! मत करो बलात्कार,
वरना हो जाओगे,
तुम नर्क के शिकार।

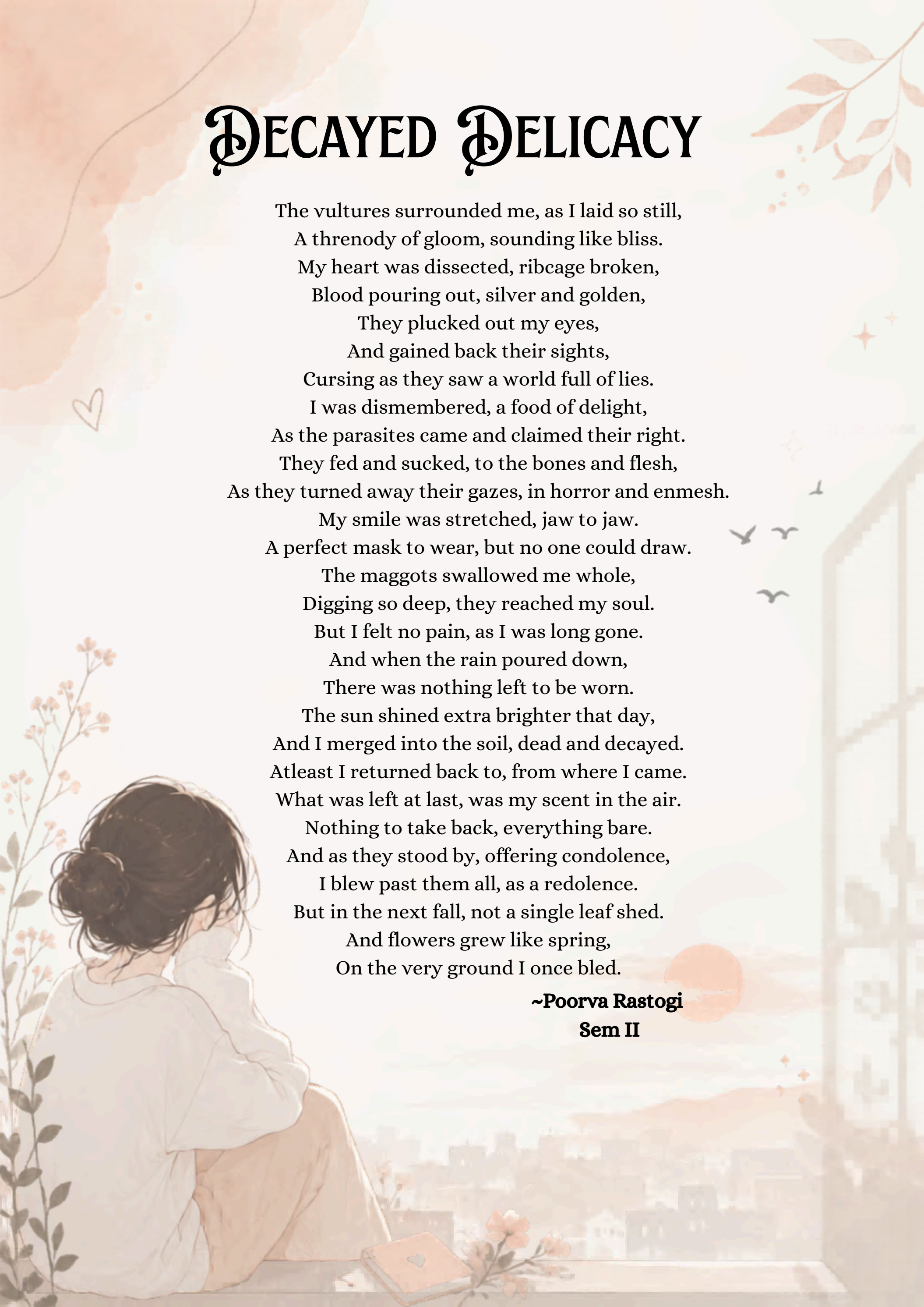
© Dolphin (Prachi Goyal)

~Prachi Goyal
Sem VI

DECAYED DELICACY

The vultures surrounded me, as I laid so still,
A threnody of gloom, sounding like bliss.
My heart was dissected, ribcage broken,
Blood pouring out, silver and golden,
They plucked out my eyes,
And gained back their sights,
Cursing as they saw a world full of lies.
I was dismembered, a food of delight,
As the parasites came and claimed their right.
They fed and sucked, to the bones and flesh,
As they turned away their gazes, in horror and enmesh.
My smile was stretched, jaw to jaw.
A perfect mask to wear, but no one could draw.
The maggots swallowed me whole,
Digging so deep, they reached my soul.
But I felt no pain, as I was long gone.
And when the rain poured down,
There was nothing left to be worn.
The sun shined extra brighter that day,
And I merged into the soil, dead and decayed.
Atleast I returned back to, from where I came.
What was left at last, was my scent in the air.
Nothing to take back, everything bare.
And as they stood by, offering condolence,
I blew past them all, as a redolence.
But in the next fall, not a single leaf shed.
And flowers grew like spring,
On the very ground I once bled.

~Poorva Rastogi
Sem II



THANK YOU NOTE



As we present Continuum 3.0, we extend our heartfelt gratitude to all our readers for their constant support and encouragement. Your enthusiasm and appreciation inspire us to continue creating meaningful and engaging content that reflects the spirit of our department. Every page of this magazine carries the hope of connecting ideas, memories, and creativity with each one of you.

We sincerely thank all the participants and contributors who shared their talent, thoughts, creativity, and hard work with us. Every article, artwork, photograph, and contribution added depth and uniqueness to this edition, making it a true reflection of collective effort and passion. Your participation transformed this magazine into something memorable and inspiring.

A special note of appreciation goes to all the members of the editorial and organizing team, along with our respected faculty members and mentors, whose dedication and guidance made this journey possible. From planning and designing to editing and coordination, every effort behind the scenes contributed to bringing Continuum 3.0 to life. Thank you all for being an invaluable part of this beautiful journey.

~ The Exponents

