January 2025

Young Scientist India

A Science & Innovation Magazine for School Students

GRASSROOTS INNOVATIONS

HOW TO BECOME A SCIENTIST

GREAT INDIAN SCIENTISTS

BRAINSTROMING TECHNIQUE

5W & 1H TECHNIQUE

Young Scientist India

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Chairman's Message

Dear Young Scientist, greetings.

Welcome to ***Young Scientist India***, an English monthly magazine dedicated to sparking curiosity and innovation among high school students and teachers! Designed to ignite ***Innovation*** and make science learning exciting, engaging, and relevant, our magazine brings you the latest discoveries, hands-on activities, and inspiring stories of scientific excellence. Whether you're a student eager to explore new ideas or a teacher looking for fresh ways to bring science to life in the classroom, ***Young Scientist India*** is your perfect companion.

Each issue features an insightful *Cover Story* on subjects related to ***Student Innovation***, along with engaging *Articles* that simplify complex concepts and showcase real-world applications. Our *Innovation Training Modules* provide you with Tools & Techniques for problem-solving and creative thinking, while *Indian Scientists, Inventions, and Innovations* highlight the remarkable contributions of our Nation's brightest minds. We also look back at *Past Innovations* for inspiration and learning.

Teachers and students can stay updated with our *Science & Innovation (S&I) Calendar*, featuring key events, celebrations, and important dates in a month. Participate in challenges like ***Samasya Khoj*** and the ***Wednesday 7 PM Quizzes*** to sharpen your analytical skills. The *Science Careers* section offers valuable insights into exciting opportunities for young minds, while our coverage of *Science Awards* recognizes outstanding achievements. With access to *Digital Libraries* and essential *Definitions*, learning is always at your fingertips.

Get involved in *S&I Contests and Events*. Keep up with the latest Innovations and breakthroughs in our *Science News Roundup*, and revisit major moments from history. Have fun with *Brain Teasers, Puzzles, and Sudoku*, and explore top *Science Labs, Research Centers, and Organizations* that are shaping the future.

To recap, we launched the **GETA Young Scientist (GYS) Program** in January 2022 with the mission of nurturing *Student Innovators for the Nation*. Over the past 36 months, the program has expanded significantly, and it is truly encouraging to see that more than 60,000 students from 22 states have participated in various GYS events.

This growth has been driven by several key initiatives such as the *GYS Wednesday Science Quizzes, GYS Charaka Science Medal, GYS Talks, GYS Swaminadhan Science Day Talent Test, GYS Samasya Khoj Contest, GYS Avishkar Awards, GYS Guru Puraskar Awards, GYST Clubs, GYS Innovation Knowledge Base, GETA Young Scientist Channel, GYS YouTube Playlists, GETA Digital Library, The Great Indian Scientists Series*, and the *GYS Social Media Channels*. Each of these efforts has played a vital role in fostering scientific curiosity, innovation, and knowledge-sharing among young minds across the country.

Once again, welcome to the *Young Scientist India Community* that celebrates curiosity, creativity, and scientific discovery – because the future of innovation begins with you!

Murali Valiveti, M. Tech.
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Indian Inventions

Ayurveda

Ayurveda, derived from the Sanskrit words "Ayur" (life) and "Veda" (knowledge), is a traditional system of medicine that originated in India over 5,000 years ago.

Introduction to Ayurveda

Ayurveda, derived from the Sanskrit words "Ayur" (life) and "Veda" (knowledge), is a traditional system of medicine that originated in India over 5,000 years ago. Often referred to as the "science of life," Ayurveda is a holistic approach to health and well-being that focuses on the balance between mind, body, and spirit.

Recognized as one of the oldest healing sciences, Ayurveda has gained global recognition for its emphasis on preventive care and natural treatments. It is believed that Dhanvantari, the physician to the gods in Hindu mythology, who received it from Brahma, the Creator.

Core Principles of Ayurveda

Ayurveda is based on the belief that health is achieved through a balance of three fundamental energies, known as "doshas": Vata, Pitta, and Kapha. Each individual has a unique constitution, or "prakriti," which is determined by the dominant doshas at the time of their birth. The doshas govern various physiological and psychological functions:

- *Vata (Air & Space):* Responsible for movement, creativity, and communication. Imbalances can lead to anxiety, dryness, and digestive issues.
- *Pitta (Fire & Water):* Governs metabolism, digestion, and transformation. An excess of Pitta can cause irritability, inflammation, and heat-related conditions.
- *Kapha (Earth & Water):* Provides structure, stability, and lubrication. Imbalances may result in lethargy, weight gain, and respiratory problems.

Understanding one's dosha helps in tailoring diet, lifestyle, and treatments to maintain equilibrium and promote health.

Ayurvedic Practices

Ayurveda employs a variety of practices to restore and maintain health.

1. Dietary Guidelines

Food is considered medicine in Ayurveda. A diet suitable for an individual's dosha type is prescribed to balance energies and prevent illnesses. Fresh, seasonal, and locally sourced ingredients are emphasized.

2. Herbal Remedies

Natural herbs and plant-based formulations are used to treat ailments and boost immunity. Commonly used herbs include turmeric, ashwagandha, neem, and tulsi.

3. Panchakarma

It is a detoxification process involving five therapeutic treatments to cleanse the body of toxins and rejuvenate the system. It includes therapies like oil massages, steam baths, and herbal enemas.

4. Yoga and Meditation

These practices are integral to Ayurveda, aiding in mental clarity, stress reduction, and physical fitness.

5. Daily Routines (Dinacharya)

Emphasize a structured daily regimen, including waking up early, practicing hygiene, exercising, and eating at consistent times.

Benefits of Ayurveda

Ayurveda offers numerous benefits.

Holistic Healing: It treats the root cause of illnesses rather than merely addressing symptoms.

Personalized Care: Treatments are tailored to individual constitutions, ensuring effectiveness.

Preventive Approach: Focus on maintaining balance; reduces the likelihood of disease.

Natural Remedies: Relies on natural and sustainable resources; avoids synthetic chemicals.

Stress Reduction: Meditation and yoga practices promote mental well-being.

Scientific Recognition and Integration

Modern science has begun to validate many Ayurvedic principles. Research supports the efficacy of Ayurvedic herbs in treating conditions like inflammation, anxiety, and diabetes. Institutions worldwide are incorporating Ayurveda into integrative medicine, blending traditional wisdom with contemporary healthcare practices.

Challenges and Future Prospects

Despite its benefits, Ayurveda faces challenges such as standardization of practices, ensuring quality control of herbal products, and combating misinformation. However, with increasing global interest in holistic and preventive healthcare, Ayurveda is poised for growth. Efforts to integrate Ayurveda with modern medical systems can further enhance its reach and credibility.

Conclusion

Ayurveda, with its timeless principles and practices, offers a pathway to holistic health and well-being. By fostering harmony between mind, body, and spirit, it provides tools to lead a balanced and fulfilling life. As more people recognize the value of natural and preventive healthcare, Ayurveda continues to inspire and transform lives worldwide.

National Startup Day - Jan 16

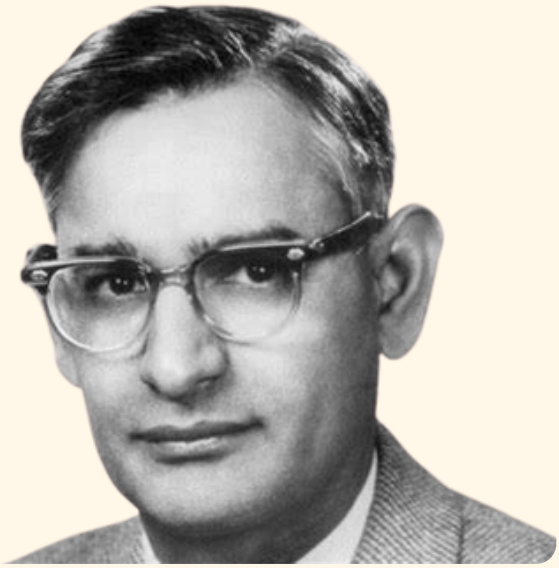
National Startup Day is observed annually on 16 January to appreciate and promote the Indian Startup Ecosystem.

Prime Minister Narendra Modi declared January 16 as National Startup Day in the year 2021. Since then various programs and events have been organized by government and non-government organizations to applaud and promote the Indian startup ecosystem.

Indian Scientist

Dr. Har Gobind Khorana

Biochemist, Padma Vibhushan, Nobel Prize in Physiology or Medicine



09 JANUARY 1922 - 09 NOVEMBER 2011

Have you ever wondered how life works at the tiniest level? What makes our bodies function the way they do? The answer lies in DNA and genes, which act like an instruction manual for life. One brilliant scientist, Har Gobind Khorana, helped decode this manual and changed the world of genetics forever!

Early Life and Education

Har Gobind Khorana was born on January 9, 1922, in a small village in Raipur, Punjab (now in Pakistan). His family was poor, but his father strongly believed in education. Khorana and his siblings studied under a tree because their village had no school! However, his hard work and brilliance earned him scholarships, leading him to study at Punjab University and later at the University of Liverpool in England, where he earned a Ph.D. in Chemistry.

Groundbreaking Discoveries in Genetics

Dr. Khorana made one of the most important discoveries in biology: *How the genetic code works*. His research explained how DNA tells cells to make proteins, which are essential for life. In simple terms, he cracked the code of life!

Scientists knew that DNA had four chemical letters (A, T, G, C). Khorana discovered how these letters form three-letter "words" called codons, which instruct cells to create specific proteins. His research helped scientists read and write genetic information, leading to advances in medicine and biotechnology.

For this incredible work, he won the Nobel Prize in Physiology or Medicine in 1968, along with two other scientists, Marshall Nirenberg and Robert Holley.

Legacy and Impact

Khorana's discoveries led to major advancements, including:

✓ Genetic Engineering - Scientists can now modify genes to cure diseases.

✓ Biotechnology - His research paved the way for producing *Insulin* and other important medicines.

✓ DNA Research - His work helped scientists understand and edit DNA, leading to discoveries like gene therapy.

Dr. Khorana was not just a brilliant scientist, he was also a great teacher who inspired young minds. Even though he passed away in 2011, his legacy lives on in modern medicine and genetic research.

Cover Story

Grassroots Innovation

Grassroots Innovation

Grassroots innovation is an approach to problem-solving and technology development that originates from local communities and individuals rather than formal institutions or corporations. In the Indian context, grassroots innovations are particularly significant due to the country's diverse socio-economic and cultural fabric. These innovations address critical challenges in rural and urban settings, often leveraging traditional knowledge, local resources, and a deep understanding of community needs. Grassroots innovation plays a pivotal role in fostering inclusivity, addressing social inequities, and promoting sustainable development in India.

Characteristics of Grassroots Innovation in India

1. *Localized Solutions:* Grassroots innovations are developed to address specific local and regional problems, such as water scarcity, agricultural challenges, or lack of electricity.
2. *Resource Efficiency:* These innovations often utilize readily available resources, including agricultural waste, bamboo, or clay, showcasing adaptability in resource-constrained environments.
3. *Cultural Relevance:* Indian grassroots innovations often incorporate cultural and traditional practices, ensuring social acceptance and ease of adoption.
4. *Affordability:* With a focus on cost-effective solutions, these innovations cater to economically weaker sections of society, making technology accessible.

Importance of Grassroots Innovation in India

1. *Empowering Marginalized Communities:* Grassroots innovations in India empower marginalized sections by addressing their specific needs in an affordable manner and provide opportunities for self-reliance.
2. *Addressing Rural Challenges:* With a majority of India's population residing in rural areas, grassroots innovations play a crucial role in tackling issues like agricultural inefficiency, water scarcity, and lack of healthcare.
3. *Enhancing Livelihoods:* These innovations often evolve into micro-enterprises, creating employment and boosting local economies.
4. *Promoting Sustainability:* Grassroots innovations emphasize the use of renewable resources and sustainable practices, aligning with India's environmental goals.
5. *Encouraging Social Inclusion:* By addressing the needs of the underprivileged, grassroots innovations contribute to reducing socio-economic disparities in India.

Examples of Grassroots Innovation in India

1. Mitticool Refrigerator

Invented by Mansukhbhai Prajapati, this clay refrigerator operates without electricity, keeping food fresh using the principle of evaporation. It is a shining example of innovation rooted in traditional pottery.

2. Jaipur Foot

This low-cost prosthetic limb developed by Bhagwan Mahaveer Viklang Sahayata Samiti has transformed lives by providing mobility to millions of amputees across India and beyond.

3. Rainwater Harvesting in Rajasthan

Grassroots innovators in Rajasthan have developed traditional methods like "baoris" and "johads" to collect and store rainwater, combating water scarcity in arid regions.

4. Farm Implements by Innovators

Farmers in Gujarat and Maharashtra have developed unique tools like low-cost seed drills and hand-operated sprayers, enhancing agricultural productivity.

5. Solar-Powered Lamps

Solar-powered lanterns created by rural innovators like Harish Hande's Selco have brought affordable lighting to off-grid villages, improving education and safety.

6. Amul's Dairy Revolution

Though institutionalized over time, the Amul cooperative began as a grassroots innovation that empowered rural dairy farmers and revolutionized India's dairy industry.

Challenges in Grassroots Innovation in India

1. *Limited Financial Support:* Grassroots innovators often struggle to secure funding to develop and scale their ideas.
2. *Recognition and Awareness:* Many innovations remain confined to local areas, lacking the visibility required for wider adoption.
3. I*ntellectual Property Rights:* Protecting the intellectual property of grassroots innovators remains a challenge in India's informal innovation ecosystem.
4. *Scaling and Commercialization:* While effective locally, scaling these innovations to benefit larger populations often requires technical and logistical support.
5. *Integration with Government Policies:* Grassroots innovations are often overlooked in policy-making, limiting their impact and reach.

Do you know?

The English word "Scientist" was first coined by **William Whewell** in the 19th century.

Strategies to Promote Grassroots Innovation in India

1. *Documentation and Dissemination:* Platforms like the National Innovation Foundation (NIF) and Honey Bee Network document, recognize, and promote grassroots innovations across India.
2. *Financial Assistance:* Initiatives such as microloans, grants, and government schemes can help grassroots innovators scale their solutions.
3. *Capacity Building:* Training programs and workshops can enhance the technical and entrepreneurial skills of grassroots innovators.
4. *Collaborative Ecosystems:* Partnerships between grassroots innovators, research institutions, NGOs, and private sectors can enhance the scalability and impact of these solutions.
5. *Policy Support:* Government policies should integrate grassroots innovations into national development agendas and provide incentives for their adoption.
6. *Recognition Platforms:* Awards, media coverage, and innovation fairs can bring visibility to grassroots innovations, inspiring others.

Conclusion

Grassroots innovation in India showcases the resilience, creativity, and resourcefulness of its people. These innovations bridge the gap between traditional knowledge and modern challenges, offering sustainable and inclusive solutions. By providing the necessary support, recognition, and resources, India can harness the power of grassroots innovation to drive socio-economic development, enhance sustainability, and improve the quality of life for millions. The future of India's progress lies in the hands of its grassroots innovators realizing the dream of *Atmanirbhar Bharat*.

Word Search 2501

I	T	A	W	M	A	J	H	Y	L	E	C	N	X	R	C	Z
D	H	O	F	C	L	U	E	Q	P	R	A	T	O	M	L	E
O	E	I	D	M	A	I	P	H	Y	S	I	C	S	Y	H	D
C	R	Z	J	O	B	U	K	B	T	F	C	R	J	W	U	A
K	M	I	C	R	O	S	C	O	P	E	C	Y	L	P	F	T
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G	E	E	F	U	T	K	P	S	P	H	R	B	T	T	C	A
A	T	D	C	M	O	B	L	Y	C	E	L	L	C	I	P	T
N	E	X	P	E	R	I	M	E	N	T	M	Y	H	C	L	O
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A	R	N	K	B	E	A	K	E	R	S	V	G	S	C	B	X
F	M	A	G	N	E	T	I	S	M	L	I	I	T	S	O	G
G	H	A	F	L	A	S	K	K	V	X	T	M	R	V	S	O
B	G	M	N	B	I	O	L	O	G	Y	Y	M	Y	W	C	F

(Answers on Back Cover Inside)

THERMOMTER CHEMISTRY PLACEBO BEAKER
MICROSCOPE ORGANISM PHYSICS FLASK
LABORATORY RESERACH SCIENCE ATOM
EXPERIMENT ANATOMY GRAVITY DATA
MAGNETISM PARTICLE BIOLOGY CELL

Riddles 2502

1. When the *son of Water* returns to the parent, it dies. What is it?
2. I can be hot, I can be cold, I can run and I can be still, I can be hard and I can be soft. What am I?
3. What is neither water nor land, and is always soaking wet?
4. Born in the ocean and white as snow, when I fall back to water I disappear without a trace. What am I?

How to Prevent the Train Platform Accidents

Railway stations are bustling hubs of activity, where thousands of passengers rely on announcements and digital displays for real-time updates on train arrivals and departures. However, most stations still depend heavily on verbal announcements, which can be confusing, especially in large stations with multiple platforms. This lack of clarity often leads to passenger haste, causing accidents and difficulties for people with hearing impairments.

The Problem: Confusing Announcements and Safety Hazards

Many passengers struggle to keep track of train status updates, especially when relying solely on audio announcements. In busy railway stations, overlapping announcements can lead to misunderstandings, resulting in last-minute rushes and unsafe boarding practices. Additionally, people with hearing disabilities are at a significant disadvantage, as they cannot rely on verbal updates.

The Solution: Color-Coded LED Coach Position Indicators

A simple yet highly effective innovation can solve this issue—enhancing existing coach position indicators with multi-colored LED displays.

Currently, most LED screens at railway stations display information in black and white. By incorporating a color-coded system, passengers can instantly recognize the status of their train, improving efficiency and safety.

Vanumu Akshaya
10th Class

The proposed LED color scheme

Red – Indicates that the train is about to arrive at the station.

Yellow – Lights up 30 seconds before the train departs, alerting passengers to board safely and on time.

Green – Displays while the train is in motion within the station.

(Source: GYS Avishkar Awards 2023 Booklet)

Marukruthi Supriya
10th Class

IV Fluid Finished Alarm

Aditya witnessed his neighbour admitted to the hospital being given uncontrolled intravenous fluid (IV), which resulted in the patient's death. IV fluids are specially formulated liquids that are injected into a vein to prevent or treat dehydration. They are used in people of all ages who are sick, injured, dehydrated from exercise or heat, or undergoing surgery. Intravenous rehydration is a simple, safe and common procedure with a low risk of complications. The IV drip of medication or fluid must be stopped after a set amount of time. He came up with a long-term solution that will alert him when the allotted time has passed to resolve this problem. If the patient is alone, an alarm will sound and the status of the drip can also be observed.

(Source: INSPIRE MANAK NLEPC 2023 Booklet)

Aditya Patidar
9th Class

Indian Scientist

Dr. Shanti Swarup Bhatnagar

Indian Colloid Chemist

Dr. Shanti Swarup Bhatnagar: The Pioneer of Indian Science. Have you ever wondered how Science and Technology in India grew so rapidly? One of the key figures behind India's scientific progress was Dr. Shanti Swarup Bhatnagar. He was a brilliant Scientist, an inspiring leader, and the founder of India's top research institutions. His contributions to Chemistry and Scientific Development helped shape modern India.

Early Life and Education

Dr. Shanti Swarup Bhatnagar was born on January 21, 1894, in Punjab, India. Sadly, he lost his father when he was very young. However, his grandfather encouraged his love for Science and Mathematics. As a child, he enjoyed building mechanical toys and solving puzzles.

His interest in Chemistry led him to study Science at Punjab University and later in London, where he completed his Ph.D. in Chemistry. After returning to India, he dedicated his life to advancing scientific research.

His Contributions to Science

Dr. Bhatnagar was a brilliant Chemist who worked on many practical problems to help industries and the Indian Government. Some of his major achievements include:

🧪 Developing Water Purification Methods – He invented a method to treat water in industries, which helped many factories function better.

🏭 Improving Oil Extraction – His research helped extract more oil from Indian fields, reducing dependence on foreign oil.

21 JANUARY 1894 - 1 JANUARY 1955

Father of CSIR – Building India's Scientific Future

One of Dr. Bhatnagar's biggest contributions was founding the Council of Scientific and Industrial Research (CSIR) in 1942. CSIR is India's largest scientific research organization, responsible for groundbreaking research in medicine, energy, technology, and more.
He also helped set up several national laboratories, such as:

🏛️ National Chemical Laboratory (NCL)
🏛️ Central Food Technological Research Institute (CFTRI)
🏛️ National Physical Laboratory (NPL)
These institutions continue to drive India's progress in Science and Technology.

Awards and Recognition

Dr. Bhatnagar's contributions were widely recognized. He was honored with:
🏅 Padma Bhushan – One of India's highest civilian awards.
🏅 Fellowship of the Royal Society (FRS) – A top international recognition for scientists.

Andhra Pradesh State Council of Science & Technology (APCOST)

The Andhra Pradesh State Council of Science & Technology (APCOST) is an autonomous body established by the Government of Andhra Pradesh with the primary objective of promoting Science & Technology in the state. It serves as a platform to implement various Science & Technology-related programs and initiatives aimed at the advancement of scientific knowledge, research, and innovation in Andhra Pradesh.

Key Functions and Activities of APCOST

- *Promotion of Scientific Research*: APCOST plays a pivotal role in encouraging scientific research across various fields such as agriculture, health, education, environment, and technology. The council works to establish research facilities and fosters collaborations between academic institutions, industry, and government bodies.
- *Technology Transfer*: The council facilitates transfer of advanced technologies to industries, ensuring that scientific developments have practical applications and contribute to the economic growth of the state.
- *Innovative Projects and Programs*: APCOST supports and funds projects that aim to tackle societal challenges through the application of Science & Technology. These initiatives often include innovative solutions for improving quality of life, sustainable development, and environmental conservation.
- *Science Popularization and Public Engagement*: One of the core objectives of APCOST is to popularize Science & Technology among the general public, especially students. The council organizes events, exhibitions, seminars, and workshops to make scientific concepts accessible and engaging to people across all age groups.
- *Collaboration with National and International Agencies*: APCOST works in coordination with national and international scientific organizations, universities, research institutions, and industries. These collaborations are essential for enhancing scientific research and facilitating knowledge exchange.
- *Funding and Grants*: The council provides financial assistance and grants for scientific research projects, innovation, and capacity-building programs, particularly those with the potential to contribute significantly to the state's development.
- *Environmental Protection and Sustainability*: APCOST also focuses on Environmental Science, working on projects related to sustainable development, pollution control, conservation of biodiversity, and addressing climate change challenges.

GETA
Young Scientist Program

GETA YOUNG SCIENTIST PROGRAM
Grooming Student Innovators for the Nation

The Prime Minister called for a commitment for Viksit Bharat by 2047. A key success factor in achieving that vision is becoming Atmanirbhar Bharat, i.e., self-reliant India. To become self-reliant, we need indigenous products and solutions. Research and Innovation are the basis for indigenous products. Educational Institutes should sow the seeds for research. Young minds of students are the best opportunity to nurture Innovation. Some foundational work is already happening in this space. However, for a country of 140 Crore people, the quantum as well as quality of Innovation is not adequate to realize the dream of Viksit Bharat.

GETA Service Trust launched **GETA Young Scientist Program (GYS Program)** to contribute to Innovation growth. It is the brainchild of Murali Valiveti, an Educator and Philanthropist. *The mission is to groom one in every 1000 high school students influenced by this program to become an Innovator.*

GYS Program itself innovates on ways and means of achieving this mission. Works on raising Science Temper among students. Promotes awareness on Innovation concepts, approaches, training programs, competitions, and events. Builds platforms for Knowledge sharing. Conducts National Contests and Awards Events for High School Students as well as Teachers on Problem Identification, Solution Design, Articulation, and Project Presentation.

Launched in January 2022, there have been over a dozen initiatives so far in three years. Major ones are briefed below. More than 62,000 students took part in 450+ events from, at least, 22 States. It is a long journey ahead.

GYS Wednesday Science Quizzes Online

To raise the Science Temper among students, there is a persistent effort in the form of Online Science Quizzes. A Quiz is published every week on Wednesdays at 7 PM promptly. Completely Online. 25 multiple choice questions with pictures and animations on the syllabus of 6th to 10th grades to be answered in 20 minutes. A digital certificate is emailed if one scores 60% or more and physical certificates are couriered to toppers each week. Cash vouchers are gifted to the best performers every month. Launched on 26 January 2022, over 45,000 quizzes were taken from all over the Country in 160 weeks and more than 14,000 digital certificates were issued to Students.

GYS CHARAKA SCIENCE MEDAL

A National Online Quiz Contest

Every 50 weeks, there is a Mega Science Quiz to win the GYS Charaka Science Medal. Conducted in two phases where the preliminary round is an online multiple choice quiz of up to 100 questions followed by a Live Quiz of the Finalists. It is a great fun to watch the fumes, anxiety, and close contests among the students. Winners are felicitated with Trophies, Certificates, and Cash Awards.

GYS talks

Many students are intelligent, but poor in articulation. To succeed in life, presentation is an important skill. GYS Talks is a platform similar to the popular TED Talks, but for Indian High School Students on topics related to Science, Innovation, and Aspirations. Regular National Contests are conducted online as Elocution or Video submissions. They are published on the GYS Talks YouTube Channel. GYS Talks platform is also open to Teachers and Educators.

GYS Swaminadhan Science Day Talent Test

28th February is celebrated as *Science Day* in India. GYS Program avails it as an opportunity to encourage Teachers and Students advancing on Innovation efforts. National contests are organized under the brand *GYS Swaminadhan Science Day Talent Tests*. To make it interesting, the nature of the Contest varies from year to year, but is related to STEM and Innovation. Trophies, Certificates, and Cash Awards are given to winning students and, in some contexts, Teachers too.

GYS SAMASYA KHOJ
A National Problem Identification Contest

To innovate, there should be a problem, a need or an opportunity clearly understood. Samasya Khoj is a national contest to nurture the habit of *observation and problem definition*. The contest is just on the problem description, not solving it. Intent is that repeated practice of identifying and narrating problems accelerates the opportunity for useful innovation. Problem definition includes a few parameters like where it happens, number of people affected, frequency of occurrence, whether there is a life threat, etc. This contest is intended to run every often for frequent attempts. Good efforts are encouraged with Mementos, Certificates, and Cash Awards.

GYS Avishkar AWARDS
Grooming Student Innovators for the Nation

The pinnacle of all efforts of GETA Young Scientist Program is *GYS Avishkar Awards* where **we bring out Innovations** themselves. Students from 6th to 12th standards take part in this National Online Science Projects Competition every year. While entries are submitted from over 22 States in India, experienced Panellists from Academia and Industry evaluate the Ideas and Innovations on parameters like genuineness, newness, potential for productization, and quality of submission. Trophies, Certificates, and lucrative Cash Awards are handed-over in an Annual Event. Guide Teachers of winning projects are also rewarded in Avishkar. An Awards Booklet is published each year presenting successful Innovations.

GYS GURU PURASKAR
Towards Nation Building

Teachers are the Nation Builders. Student Innovation is possible only under the Guidance of Teachers. So, it is vital to recognize and motivate Teachers that go beyond books to train as well as encourage Students to Innovate. GYS Guru Puraskar Awards competition is organized around the Teacher's Day every year felicitating talent as well as enthusiasm in Teachers. Written Essays, Video Essays, Online Debates, are a few methods adopted. Recognitions include Trophies, Certificates, and Cash Awards, typically by the hands of a Celebrity.

GYST CLUB
Home for Innovation

Science Clubs in Educational Institutions have been a practice for ages. GETA Young Scientist Talent Clubs, in short, GYST Clubs are yet another platform in High Schools where students get information to their fingertips. Announcements and schedules on Science & Innovation Competitions, Events, Materials, and Projects are shared with GYST Club Members regularly. Seminars, Workshops, Science Exhibitions, Science & STEM Lab Visits, Industrial Visits, Intra and Inter-Club Contests are facilitated for GYST Clubs.

INNOVATION LEADS TO ATMANIRBHAR BHARAT

GYS Innovation Knowledge Base

Knowledge is power. GYS Program Team compiled details on over **8200 Student Innovation Projects** into a Knowledge Base. Publicly available projects information on Winners and participants in National Level Exhibitions are collected and made available to everyone in an easily accessible Telegram Channel. Competitions like GYS Avishkar, INSPIRE MANAK, NCSC, IGNITE, NIF Grassroots Innovation Fests are covered. By going through these projects, Teachers and Students get an understanding on what kind of Ideas and Innovations are happening in the Country. In fact, **they provide inspiration** to new ideas for further Innovation.

GYS Digital Library

Library is a place of knowledge and wisdom. GYS Program Team collects Science and Innovation related articles, infographics, books and magazines available in the public domain for free access. They are easily accessible on a Telegram Channel. Teachers and Students can search for content, view, read, print, or download.

The Great Indian Scientists Series

Bharat is a country of ancient wisdom, a land of Great Rishis, Gurus, Mathematicians, and Scientists. There were age-old contributions from Charaka, Aryabhatta, Bhaskara, Agastya, Kanada kind of Rishis and Gurus. Modern day too offered eminent personalities like Vikram Sarabhai, Har Gobind Khorana, Shanti Swarup Bhatnagar, M Visvesvarayya, SN Bose, JC Bose, CV Raman, and the list goes on.

GYS Team takes pride in compiling works of these Great Indian Scientists in the form of Quick-read Infographics, Flyers, YouTube Playlists, and runs exclusive Talent Tests. The objective of this series is to present such Role Models to be a wonderful source of Inspiration to the younger generation.

GYS YouTube Playlists

Many a time, students look for guidance on competitions and events. GYS Program Team made life pretty easy. There are very rich Playlists for Students and Teachers alike. Someone wants to know about Vidyardhi Vignan Manthan (VVM), someone else is searching for INSPIRE MANAK projects, and yet another student is curious about National Children's Science Congress (NCSC). Teachers are assisted with Tools, Techniques, and Concepts related to Student Innovations. **20 GYS YouTube Playlists** are available on competitions and themes like these. New entries are searched for and added to these Playlists every week. It is like all cooked food is ready on a platter. Saves time.

GETA Young Scientist Channel

YouTube Channels are pretty popular and helpful these days. GYS Program features a comprehensive coverage of videos on Innovation and Science Projects. All the noteworthy presentations from GYS Avishkar, GYS Talks, GYS Guru Puraskar, etc. are uploaded here. From time to time, GYS Team provides guidance on Winning Science Competitions. Live coverage of the GYS Program Events is available on this Channel. GYS YouTube Channel is a treasure of Playlists too.

GYS Social Media Channels

Today is the age of Social Media. Facebook, Instagram, X (Twitter), WhatsApp, YouTube, and you name it. GYS Program regularly publishes announcements and information on these Channels. Messages cover Science and Innovation Contests, Events, Material Sources, and Links to Reference Sites. In the first two years of the GYS Program, over 65 lakh messages were pushed through on these Channels. Once registered with the GYS Program, updates are sent on WhatsApp to the Student number directly.

India's Supercomputer AIRAWAT

Powering the Future with AI

What is AIRAWAT?

AIRAWAT is India's powerful supercomputer designed specifically for Artificial Intelligence (AI) research. The name AIRAWAT stands for AI Research Analytics and Knowledge Assimilation Platform. It is part of India's National AI Mission and helps scientists, researchers, and students in developing advanced AI models.

Why is AIRAWAT Important?

Supercomputers like AIRAWAT are thousands of times faster than regular computers. They process huge amounts of data quickly, which is essential for solving complex problems. AIRAWAT is being used in many fields, such as:

- Healthcare – Helping doctors find new medicines and diagnose diseases faster.
- Agriculture – Improving crop prediction and reducing food wastage.
- Weather Forecasting – Providing more accurate weather predictions to prevent disasters.
- Cybersecurity – Detecting online threats and protecting important information.

How Fast is AIRAWAT?

AIRAWAT is ranked among the Top 100 AI Supercomputers in the World! It has a processing speed of AI Petascale, meaning it can perform trillions of calculations per second. This makes it one of the fastest AI-focused supercomputers in India.

Where is AIRAWAT Located?

AIRAWAT is housed at C-DAC (Centre for Development of Advanced Computing) in Pune, India. C-DAC is known for developing India's first supercomputer, PARAM, and continues to lead India's technology advancements.

The Road Ahead

AIRAWAT marks the beginning of India's AI supercomputing journey, with plans to enhance its capabilities further. Continuous upgrades and integration with next-generation AI models will ensure that India remains at the forefront of AI and HPC advancements.

As India moves toward becoming a global AI hub, AIRAWAT stands as a testament to the country's technological prowess, fostering innovation and digital transformation at an unprecedented scale.

Advanced Materials and Processes Research Institute

सीएसआईआर- एम्प्री
CSIR-AMPRI

Advanced Materials and Processes Research Institute (AMPRI), Bhopal, is a constituent laboratory of the Council of Scientific and Industrial Research (CSIR), New Delhi. It was started in the year 1981 in the undivided state of Madhya Pradesh as a Regional Research Laboratory (RRL). Based on the core strength and R&D expertise, RRL has been renamed as the Advanced Materials and Processes Research Institute (AMPRI) from March 2007 onwards by the CSIR to give more visibility for carrying out focused research. The website provides information about the institute, its mandate, vision, niche areas, and R&D activities.

Current Programs and Future Perspectives

Scientists in AMPRI are specialized in different disciplines of materials science and other related areas. AMPRI is equipped with modern facilities for material synthesis, processing and property characterization such as SEM, pressure die casting machine, semisolid processing unit, rolling mill, Mg melting unit etc. FESEM, cryomilling units and those related to nanoscale R&D are being established.

Current activities of AMPRI are broadly categorized under:

- Lightweight Materials
- Nanostructured Materials
- Smart and Functional materials
- Waste to Wealth
- CSIR-800

In the category of lightweight materials, important activities relate to Al metal matrix composites, polymer matrix composites, Al foam and Mg-based alloys. AMPRI has laid a major emphasis on lightweight materials development like Al foam, Mg-based alloys, in-situ MMCs and nanostructured materials. Also, activities on electromagnetic forming, smart and functional materials, steel and Ti foams, and materials modelling and design are in the offing.

In the area of Waste to Wealth, the institute largely worked on the utilization of fly ash and Red Mud. The institute has developed wood substitute technology using red mud, fly ash and natural fibers which has potential applications for making doors, panels, partitions and furniture. AMPRI has developed Radiation Shielding Materials from Red Mud and holds a US Patent on the work. The potential applications of this technology include shielding of gamma and neutrons in nuclear power plants and for diagnostic X-ray shielding in X-ray and CT scan rooms.

Innovation Training Module

Brainstorming

Unlock Your Best Ideas!

1. What is Brainstorming?

Brainstorming is a collaborative process where individuals or groups come together to ***generate a wide range of ideas*** or solutions for a specific problem or challenge.

Developed by Alex Osborn in the 1940s, brainstorming emphasizes open communication, creativity, and the suspension of judgment during the idea-generation phase.

This process allows participants to think outside the box and propose unconventional solutions without the fear of criticism.

2. Importance of Brainstorming

Brainstorming is a cornerstone of problem-solving and innovation in various settings, from business to education and personal development.

Here are some key reasons why brainstorming is essential:

- *Encourages Creativity:* It fosters out-of-the-box thinking and inspires participants to approach challenges from different perspectives.
- *Enhances Collaboration:* Brainstorming brings together diverse viewpoints and encourages teamwork.
- *Generates Multiple Solutions:* By exploring a broad range of ideas, brainstorming increases the likelihood of finding the best possible solution.
- *Breaks Mental Blocks:* It helps individuals overcome mental barriers and discover new approaches to problems.

3. Principles of Effective Brainstorming

To ensure successful brainstorming sessions, adhere to these core principles.

- *Defer Judgment:* Avoid critiquing or evaluating ideas during the initial phase.
- *Encourage Wild Ideas:* Promote creativity by welcoming even the most unconventional suggestions.
- *Build on Others' Ideas:* Use the "yes, and..." approach to enhance and expand on ideas.
- *Stay Focused on the Topic:* Clearly define the problem or objective to maintain relevance.
- *Aim for Quantity:* Generate as many ideas as possible to increase the chances of finding innovative solutions.
- *Be Visual:* Use diagrams, charts, or sticky notes to visualize ideas and connections. Display them being visible to the participants. Write ideas on whiteboards or present on a projector as they unfold.
- *Equal Opportunity:* Encourage all participants to ideate and speak out. A beautiful technique to achieve this is applying the Round Robin method where each one gives just one idea and let's the next one take the chance.

4. Types of Brainstorming Techniques

Different techniques can be used to suit the needs of various situations. Here are some popular brainstorming methods:

4.1. Traditional Brainstorming

Participants gather in a group, and each person shares ideas aloud. A facilitator records these ideas for further evaluation.

4.2. Mind Mapping

Mind mapping involves creating a visual representation of ideas, starting with a central concept and branching out into related topics. This method helps identify relationships between ideas and can reveal patterns or gaps in thinking.

4.3. Brainwriting

Instead of verbalizing ideas, participants write their suggestions on paper or sticky notes. These ideas are then shared and discussed. Brainwriting can be particularly effective in larger groups or divergent groups or when participants are hesitant to speak up.

4.4. Scamper

SCAMPER is a structured technique that encourages participants to explore ideas through seven prompts: Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, and Reverse. This method stimulates creativity by prompting specific ways to think differently about a problem.

5. Preparation for a Brainstorming Session

It is important that the Facilitator does a groundwork and arrange materials or facilities in advance. Also, communicate as needed.

- *Define the Objective:* Clearly articulate the problem or challenge to focus the discussion.
- *Assemble the Right Team:* Include individuals with diverse skills, backgrounds, and perspectives.
- *Set Ground Rules:* Establish guidelines, such as "no criticism" and "respect all ideas."
- *Choose a Conducive Environment:* Select a comfortable, distraction-free space for the session.
- *Provide Tools and Resources:* Have materials like whiteboards, sticky notes, markers, or brainstorming software ready.

6. Conducting the Brainstorming Session

Effective brainstorming requires careful planning and preparation. Here are steps to ensure a productive session:

- *Start with an Icebreaker:* Engage participants with a creative exercise to loosen up and spark creativity.
- *Introduce the Problem:* Clearly state the objective and outline the session's structure.

- *Encourage Participation:* Ensure everyone has an opportunity to contribute ideas.
- *Facilitate and Moderate:* Guide the discussion to stay on track and maintain a positive atmosphere.
- *Record Ideas:* Capture every idea, no matter how unconventional, for later evaluation.

7. Evaluating and Implementing Ideas

After generating ideas, though strictly not a part of Brainstorming, the next step is to evaluate and implement the most promising ones. Here's how:

- *Organize Ideas:* Group similar ideas and eliminate duplicates, e.g., Affinity grouping.
- *Assess Feasibility:* Analyze each idea's practicality, cost, and potential impact.
- *Prioritize Solutions:* Rank ideas based on criteria such as relevance, feasibility, and innovation.
- *Create an Action Plan:* Develop a clear plan for implementing the selected ideas, including timelines, responsibilities, and resources.

8. Tips for Successful Brainstorming

Here are a few strategies as well as tactics to generate good number of ideas from a Brainstorming session:

- *Encourage Participation:* Create a safe space where all participants feel comfortable sharing ideas.
- *Stay Flexible:* Adapt techniques and approaches as needed to suit the group and problem.
- *Celebrate Creativity:* Acknowledge and appreciate all contributions to foster a positive environment.
- *Reflect and Improve:* After the session, review what worked well and identify areas for improvement.

9. Applications of Brainstorming

Brainstorming can be applied in various contexts, including:

- Community Projects: Engaging stakeholders to address local challenges and develop solutions collaboratively.
- Education: Encouraging students to think creatively and collaborate on projects.
- Business: Developing marketing strategies, solving operational problems, or designing new products.
- Personal Development: Generating ideas for personal goals, hobbies, or problem-solving in everyday life.

Conclusion

Brainstorming is a versatile and powerful tool for generating ideas, solving problems, and fostering creativity. By following the principles, techniques, and tips outlined in this guide, you can make your brainstorming sessions more effective and enjoyable.

Understanding the principles and regular practice by Teachers can help generate ideas as well as solutions for rich and effective Student Innovations.

CCMB - Centre for Cellular and Molecular Biology

The Centre for Cellular and Molecular Biology (CCMB) is a premier life sciences research institution in India. It is located in Hyderabad, Telangana, and operates under the umbrella of Council of Scientific and Industrial Research (CSIR). Established in 1977, CCMB has gained recognition for its groundbreaking research in the field of molecular and cellular biology.

Profile

CCMB is a premier research organization in frontier areas of modern biology. The objectives of the Centre are to conduct high quality basic research and training in the inter-disciplinary areas of biology.

CCMB was set up initially as a semi-autonomous Centre on April 1, 1977 with the Biochemistry Division of the then Regional Research Laboratory (presently, Indian Institute of Chemical Technology, IICT), Hyderabad forming its nucleus and Dr P M Bhargava heading the new Centre.

Research

The ongoing research programs at the CCMB are in three major categories - high quality basic research in the frontier areas of modern biology, research relevant to societal needs, and application-oriented research towards commercialization. These include the areas of evolution & development, gene regulation in prokaryotes and eukaryotes, host-parasite interactions, membrane biology, protein structure, stem cell biology, neurobiology, bioinformatics, functional genomics, ecology and ecosystems.

The institution focuses on translating biological discoveries into applications in healthcare, agriculture, and environmental science. Its research spans various fields, including genetics and genomics, molecular and structural biology, cell and developmental biology, biotechnology, and wildlife conservation biology. Among its significant achievements is the development of DNA fingerprinting technology in India, which has been instrumental in forensic science, wildlife conservation, and paternity testing.

Contact Address

CSIR-Centre for Cellular and Molecular Biology
Uppal Road,
Hyderabad - 500007
Telangana, India.

Website: www.ccmb.res.in

Indian Scientist

Dr. Raja Ramanna

Nuclear Physicist, Padma Shri (1968),
Padma Bhushan (1973), Padma Vibhushan (1975)

Imagine a world where science and music go hand in hand. A scientist who helps build India's nuclear program but also plays the piano like a pro. Fascinating, right? That's exactly who Dr. Raja Ramanna was — a brilliant Scientist, a passionate Musician, and a true Patriot.

A Curious Mind from the Start

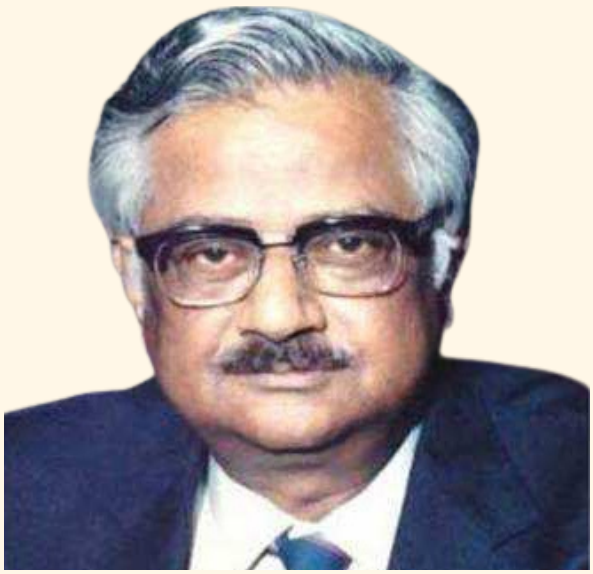
Born on January 28, 1925, in Karnataka, young Raja was always full of curiosity. He loved taking things apart just to understand how they worked. His love for Science led him to study Physics at college, where he developed a keen interest in Nuclear Energy — the force that powers the Sun and can also generate electricity.

But science wasn't his only passion. He was also deeply interested in Western Classical Music and became an expert Pianist. His ability to balance both Science and Art was truly remarkable!

The Man Behind India's Nuclear Power

In the 1950s, India was building its nuclear program under the leadership of Dr. Homi Bhabha. Dr. Ramanna joined the Bhabha Atomic Research Centre (BARC) and quickly became one of the most important scientists in the country.

His biggest achievement? Leading India's first nuclear test in 1974 at Pokhran. This test, called "Smiling Buddha," made India one of the few nations in the world with nuclear capabilities.



28 JANUARY 1925 - 24 SEPTEMBER 2004

More Than Just a Scientist

Dr. Ramanna wasn't just about Nuclear Science, he was a man of many talents:

🎼 Music Maestro - He played the piano like a professional and loved Beethoven and Mozart.

📚 Philosopher & Writer - He was fascinated by ancient texts and often wrote about Science and Philosophy.

🏆 Leader & Teacher - He served as India's Minister of State for Defense and mentored many young scientists.

Dr. Ramanna believed that science should always be used for the good of society. His dedication, curiosity, and passion remind us that with hard work and knowledge, we can achieve great things.

So, whether you dream of being a scientist, an artist, or a leader, Dr. Raja Ramanna's story is an inspiration to look up to! 🚀

S&I Article

How to become a Scientist?

Becoming a scientist is a rewarding journey that combines curiosity, dedication, and hard work. Scientists are individuals who investigate the natural world, solve problems, and expand the boundaries of human knowledge. Here is a comprehensive guide on how to embark on the path to becoming a scientist, structured into steps that can span years of education, training, and experience.

1. Understand What a Scientist Does

Before pursuing a career in science, it is essential to understand what scientists do. Scientists are involved in:

- Conducting research to answer questions and solve problems.
- Analyzing data to draw meaningful conclusions.
- Publishing findings to contribute to the global body of knowledge.
- Collaborating with peers across disciplines.

Scientists work in various fields, such as biology, physics, chemistry, environmental science, and computer science. Each discipline offers unique challenges and opportunities.

2. Cultivate Curiosity, grow Love for Learning

The journey begins with an innate curiosity about the world. Scientists are passionate about asking questions and seeking answers. To nurture this curiosity:

- Read widely about different scientific fields.
- Explore documentaries, podcasts, and books on scientific topics.
- Engage in hands-on experiments at home or in school.
- A strong foundation in curiosity will sustain you through the challenges of scientific research.

3. Focus on Science and Math in School

During your school years, prioritize subjects like biology, chemistry, physics, and mathematics. These are foundational to all scientific disciplines. Some tips include

- Take quizzes often.
- Join science clubs.
- Participate in science fairs.
- How about an activity in robotics?
- Watch science channels/programs.
- Read science magazines and books.
- Take advanced courses in science.
- Probably, learn vedic math or abacus.
- Look up to some role models.
- Study innovations and inventions.

The list goes on. These activities help you develop critical thinking and problem-solving skills. Strengthen the desire to become one.

4. Pursue a Bachelor's Degree

A bachelor's degree is the first formal step towards becoming a scientist. Choose a major that aligns with your interests, such as:

- Biology for a career in life sciences.
- Physics or engineering for careers in physical sciences.
- Computer science for careers in artificial intelligence or data science.
- Environmental science for careers in sustainability.

During your undergraduate years...

- Take courses relevant to your field of interest.
- Gain research experience by working in university labs or summer research programs.
- Network with professors and peers who share your passion for science.

January in Science History

January holds significant importance in the Indian context for contributions to science, technology, and notable events in history. Here are some key milestones and events in science and related fields from India during the month of January:

Environmental Initiatives

January 19, 1980: The Gir National Park in Gujarat was declared a national park, highlighting India's efforts in conserving the Asiatic lion and promoting wildlife conservation.

Notable Birth Anniversaries

January 2, 1920: Birth of Satyendra Nath Bose, the renowned Indian physicist after whom the "Boson" particle is named. His work in quantum mechanics, particularly Bose-Einstein statistics, laid the foundation for the discovery of the Higgs boson.

January 30, 1887: Birth of Subroto Mukherjee, the first Chief of the Indian Air Force, symbolizing India's advances in aeronautics and defense technology.

Technological Innovations

January 10, 2010: India's Tata Nano, the world's cheapest car, was introduced. It showcased Indian engineering innovation in cost-effective manufacturing.

Historical Scientific Contributions

January 16, 1966: Dr. Homi J. Bhabha, the father of India's nuclear program, tragically passed away in a plane crash. His work laid the foundation for India's nuclear energy and atomic research.

Space Science and Exploration

January 3, 2019: ISRO successfully launched the GSAT-7A, a communication satellite enhancing the capabilities of the Indian Air Force.

January 24, 2007: ISRO launched its PSLV-C7 rocket, which successfully deployed four satellites, showcasing India's growing space technology capabilities.

Medical and Biological Advances

January 14, 1969: The All-India Institute of Medical Sciences (AIIMS), New Delhi, performed its first successful open-heart surgery, marking a milestone in Indian medical science.

Sudoku Challenge 2501

5		9	4					
		3				6	9	
	1							5
	5		1	8				
3				5				7
				9	6		5	
9							7	
	3	8				5		
					7	1		3

(Answers on Back Cover Inside)

GYS Avishkar AWARDS

Grooming Student Innovators for the Nation

GYS Avishkar Awards is a prestigious National Science Projects Competition designed for students from classes 6 to 12. This competition aims to identify and promote innovative ideas that have the potential to create a significant impact on society.

Unique Features of GYS Avishkar Awards

Most science competitions typically take place between October and January during the academic year and reward students. But, the GYS Avishkar Awards stand out due to two distinct features:

1. *Utilization of Summer Holidays*: Being scheduled between April and August, GYS Avishkar Awards give opportunity to students and their guide teachers availing summer holidays effectively to develop their projects at a comfortable pace.
2. *Recognition of Guide Teachers*: This competition not only acknowledges the efforts of students but also recognizes and rewards the guide teachers who mentor and support students winning the competition.

A Completely Online Competition

- One of the biggest advantages of the *GYS Avishkar Awards* is that it is conducted entirely online. Students can develop their projects from the comfort of their homes and submit in video format.

Project Submission

Students need to submit a 3 to 7-minute video demonstrating their idea, model, or prototype. The video must include a voice explanation and should clearly present *the problem being addressed, solution proposed, marketability of the idea, etc.*

Additionally, the video should be well-structured with *a cover page, appropriate titles, intermittent captions, a closing page, and so on making it meaningful.*

Evaluation Criteria

On the website, the competition organizers provide clear evaluation criteria to help students craft a winning project. Participants are encouraged to carefully review the competition terms & conditions as well as the project submission format to ensure they meet all the requirements.

By taking part in the GYS Avishkar Awards 2023, students get a unique opportunity to showcase their creativity, problem-solving skills, and innovative thinking—all while enjoying a productive and enriching summer experience. So, start brainstorming, bring your ideas to life, and make an impact! Avishkar Awards booklets presenting winners of previous years are available on the website.

GYS Avishkar AWARDS 2023

Grooming Student Innovators for the Nation

Theme: Low Cost Grassroots Innovation

The GYS Avishkar Awards 2023, a prestigious national science project competition for students from classes 6 to 12, witnessed an overwhelming response from young innovators across the country.

The competition aimed to identify and promote groundbreaking ideas that have the potential to create a positive societal impact and be commercially viable.

Enthusiastic Participation from 11 States

In the very first attempt, the competition received an impressive 151 project submissions from 11 states, showcasing an incredible creativity and scientific curiosity of students nationwide.

After a rigorous evaluation process, 32 projects were shortlisted for the final round, where participants had the opportunity to further refine and present their ideas.

Recognizing the Best Innovations

In the final round, a distinguished panel of experts meticulously assessed the projects based on innovation, feasibility, societal impact, and market potential. After careful deliberation, the panel selected:

- 3 Winning Projects
- 9 Consolation Prize Winners

These outstanding projects exemplified originality, scientific rigor, and practical applicability, making them worthy of recognition and accolades.

Here are the **12 Student Innovations** brought out by GYS Avishkar Awards 2023:

1. Think Taste Drink Taste
2. How to Prevent Train Platform Accidents
3. Healthy Blackboard Duster
4. Tubo Hot - Energy Saving Water Heater
5. Cow Dung & Cow Curd use instead of Chemical Fertilizers
6. Hole Monitoring and Cleaning

7. Reduce and Produce
8. Smart Apron for Delivery Boys / Girls
9. Power Play
10. Bio Pots
11. River Cleaning Boat
12. Pot Cooler - an Eco-Friendly Cooler

The Awards function was held at the Regional Science Center, Vijayawada. Dr. Y. Aparna, Member Secretary, Andhra Pradesh State Council of Science & Technology (APCOST) graced the occasion and handed over the Prizes to Winners.

Platform to the Next Generation of Student Innovators

The GYS Avishkar Awards continues to inspire young minds to think beyond textbooks and develop innovative solutions to real-world problems. By providing a platform for students to showcase their talent and creativity, the competition not only fosters scientific temper but also nurtures the spirit of entrepreneurship.

GYS Avishkar AWARDS 2024

Grooming Student Innovators for the Nation

Celebrating Innovation in Science

With same theme of Low Cost Grassroots Innovations, GYS Avishkar Awards 2024 made progress. There were 306 submissions from 20 states. 262 projects were qualified after initial screening.

After careful deliberation in the first round of evaluation, 45 projects were shortlisted for the final round. From these, the panel selected:

- 3 Winning Projects
- 10 Consolation Prize Winners

Below are the **13 innovations** from GYS Avishkar Awards 2024.

1. Taap Rakshak: Fireproof Material
2. AMCERD-F: Artificial Moisture
3. MacMed
4. Farmer's Friendly Bicycle
5. Autoswitch (Person Conting Device)
6. Smarty Washer
7. CARES: Animals on Roads - Enhancement of Safety
8. Smart Umbrella
9. Alert Drive Headgear
10. Automatic Cloth Dryer
11. Gradient Doors for Train
12. Caliper-X: Prosthetic Leg Improved Model
13. Project Title: AI Based Coma Patient Monitoring System

The Awards ceremony was held at RK College of Engineering near Vijayawada on 05 Oct 2024. Mr. M. Amarnath, Secretary and Member on the College Governing Board graced the occasion.

Indian Scientist

Dr. Ganapathi Thanikaimoni

Palynologist, Botanist

Have you ever wondered how scientists uncover secrets about ancient climates, extinct plants, and even past civilizations? One such scientist was Dr. Ganapathi Thanikaimoni, an Indian palynologist — a specialist in studying pollen! His work helped us understand how plant life evolved over millions of years and how climate changes affected our planet.

A Curious Mind from the Beginning

Dr. Ganapathi Thanikaimoni was born in India in 1938. From a young age, he was fascinated by nature, especially plants and flowers. This passion led him to study botany, the science of plants. But instead of just looking at trees and flowers, he became interested in something much smaller — pollen grains.

The World of Pollen: A Window to the Past

Pollen might be tiny, but it holds a lot of information! Dr. Thanikaimoni is an expert in palynology, the study of pollen and spores. He discovered that by studying ancient pollen trapped in soil and rocks, scientists could learn about the past environment, climate, and even human history.

His research helped answer important questions:

🌱 What kinds of plants existed thousands or millions of years ago?
🌧️ How did the climate change over time?
🏛️ What kind of vegetation surrounded ancient human settlements?

01 JANUARY 1938 - 05 SEPTEMBER 1986

The Scientist Who Studied Ancient Pollen

Dr. Thanikaimoni's work took him all over the world. He conducted research in India, France, and Southeast Asia, where he studied pollen from mangroves, forests, and historical sites. His studies were useful for scientists in many fields, including:

🔬 Archaeology - To learn what ancient civilizations grew and ate.
🌍 Climate Science - To understand how Earth's climate changed over time.
🌿 Botany & Ecology - To protect endangered plant species.

He is an Inspiration

✅ Curiosity leads to discovery - His passion for tiny pollen grains led to big discoveries.
✅ Every detail matters - Even the smallest things in nature can teach us important lessons.
✅ Science connects us to history - His research helped uncover ancient environmental secrets.

Innovation Training Module

5Ws & 1H

A Simple Content Development Technique

Introduction

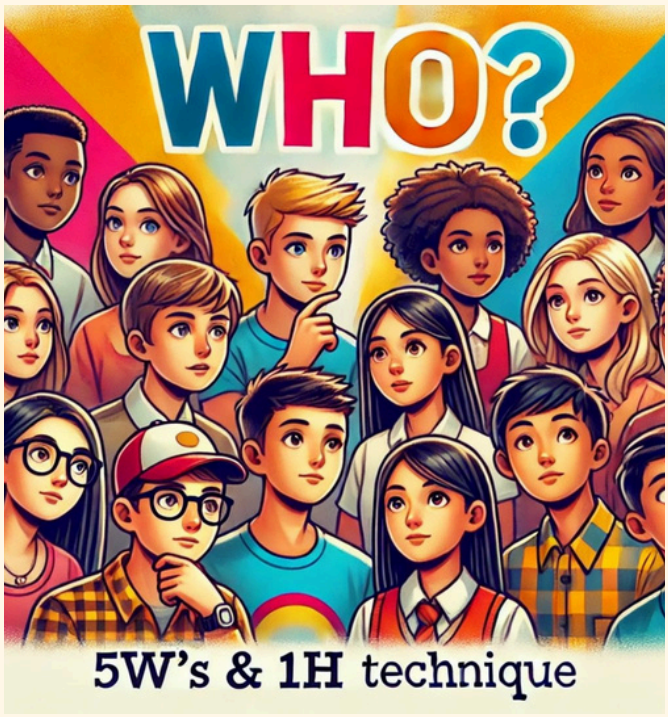
Dear Students, many of you write Essays for School Competitions and participate in Elocution in some National Contests. Some may be the Master of Ceremony at School Events. Sometimes you may have to do Extempore on a topic completely unprepared. In all such contexts, building content requires a structured, yet creative approach. One of the best techniques to get ready with the contest is the 5W's & 1H Technique. It involves answering six fundamental questions: **Who, What, When, Where, Why, and How**. By addressing these questions, one can create well-rounded and engaging content. With practice, using this technique, you can deliver speeches even at a short notice. This method is widely used in journalism, research, problem-solving, and creative writing.

The Technique

Let's explore each of these questions and how they contribute to building compelling content. In the next section, we will have a comprehensive example of building an Essay demonstrating the technique.

1. Who: The "Who" question focuses on identifying the main characters or subjects that your content revolves around. Whether you are solving a problem, building a Science Project, writing an essay, or creating a presentation, understanding the individuals or groups involved is crucial. Once you know the stakeholders, you can make your content more relatable. Look at the below examples on using this question WHO, gather answers, and you will have some content ready for your speech...

- Who leads the project?
- Who are the team members?
- Who benefits from the outcomes?
- Who is the target audience?



- Who funds the project?
- Who conducts the experiments?
- Who validates the findings?
- Who implements the innovation?

2. What: The "What" question delves into the heart of your content by defining the central theme, problem, project solution, or concept you aim to address.

This question encourages you to identify the main subject matter and clearly communicate the purpose of your content.

Let's see a few "What" questions answering which helps in building insightful content for your project report...

- What is the project's goal?
- What problem does it solve?
- What materials are needed?
- What methods are used?
- What are the expected outcomes?
- What data is collected?
- What are the findings?
- What are the next steps?

3. Where: The "Where" question prompts you to consider the location or setting of your content. Understanding the geographical context can help paint a vivid picture for your audience and enable them to visualize the scenario. This question is especially crucial when writing about events, historic moments, or specific locations. So, as an example, let us apply these "Where" questions for an Innovation Project and gather responses...

- Where did the idea originate?
- Where is the research conducted?
- Where will data be collected?
- Where are the materials sourced?

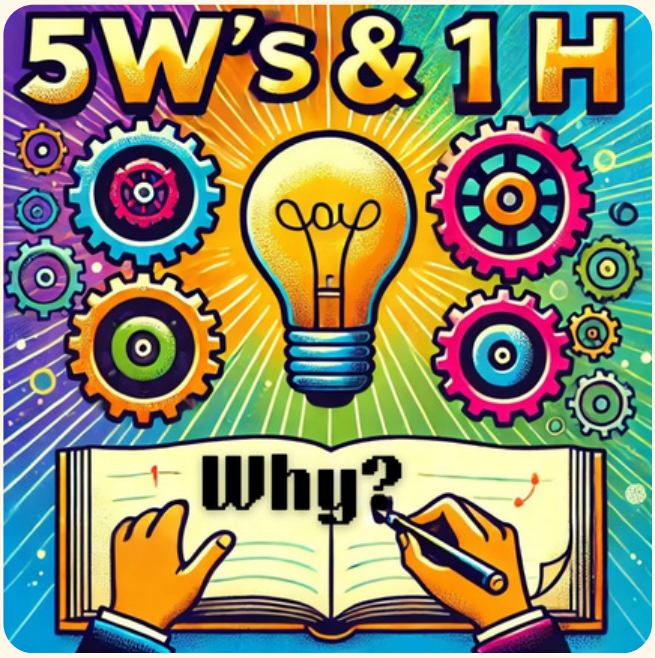
- Where do experiments take place?
- Where will testing be done?
- Where will the results be published?
- Where are the stakeholders located?

4. When: The "When" question focuses on time and chronology.

By defining the timeframe, you enable your audience to comprehend the context and evolution of your subject. It helps avoid confusion and lends credibility to your content. Let's look at a few "When" questions answers of which would help in an Essay perhaps...

- When does the project start?
- When are the milestones?
- When will data be collected?
- When will experiments conclude?
- When are results expected?
- When is the project deadline?
- When will the innovation be available for use?
- When will funding be received?

5. Why: The "Why" question digs deep into the motivations, justifications, or causes behind the project, innovation or the chosen topic. Understanding why something occurs or why it



is relevant proves to be very value-adding to your content. "Why" is a very powerful tool. This question may be applied in many ways to cull useful answers helping your Elocution or Debate. Shall we give it a try?

- Why start this project?
- Why this methodology?
- Why these criteria?
- Why these materials?
- Why this equipment?
- Why this audience?
- Why this region?
- Why these results?
- Why collaborate with these partners?
- Why invest in this technology?
- Why publish in this journal?

6. How: The "How" question focuses on the methodology, processes, or strategies involved in achieving a particular outcome. By providing step-by-step explanations, demonstrations, or infographics, you can make complex concepts more accessible and engaging for your audience. "How" completes the presentation, be it an Essay, a Speech, or a Project Report. Here are a few "How" questions to answer for completeness of your content...

Let's see a few "What" questions answering which helps in building insightful content for your project report...

- How are goals set?
- How does it benefit users?
- How is success defined?
- How is the project funded?
- How is the team organized?
- How is it tested?
- How is data collected?
- How are results analyzed?
- How is progress tracked?
- How are risks mitigated?
- How is it implemented?

Summary

The 5W's & 1H technique is a valuable tool for structuring scientific projects. By systematically addressing key questions, you can develop clear, logical, and impactful innovations.

Science and everyday life cannot and should not be separated.

Rosalind Franklin

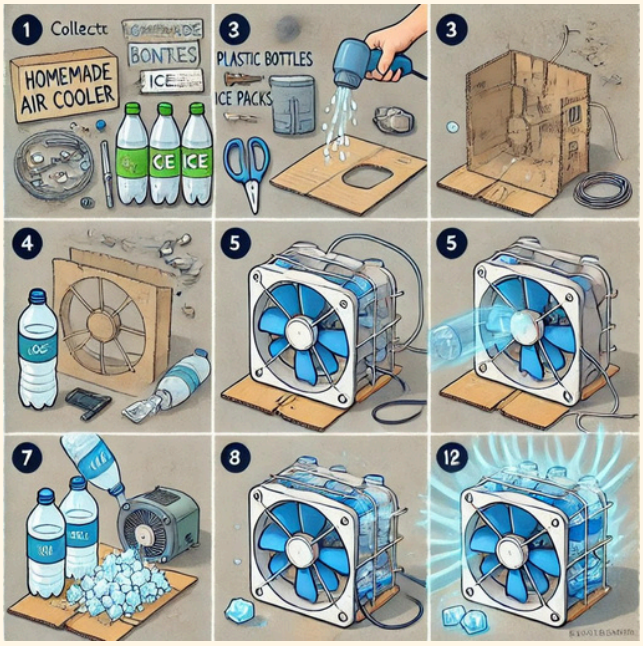
Take a project to Build a Low-Cost Home-Made Air Cooler Using Recycled Materials. Let us Apply 5W's & 1H Technique to this context and write a Project Summary at the end.

Who

- Who is designing the air cooler? - A group of high school students as part of a science project.
- Who will benefit from this innovation? - People in hot regions who cannot afford expensive air conditioning.
- Who will provide the necessary materials? - The students will collect discarded items from their homes and local recycling centers.
- Who will test the efficiency of the air cooler? - Teachers, classmates, and local community members.
- Who will help in building the prototype? - Mentors, science teachers, and family members.

What

- What is the primary goal of the project? - To create an affordable and eco-friendly air cooling solution using recycled materials.
- What materials will be used? - Plastic bottles, a small fan, cardboard, ice packs, and a used motor.
- What is the working principle of the air cooler? - It cools the air by passing it through ice-filled recycled bottles with the help of a fan.
- What safety measures need to be considered? - Ensuring electrical safety &n proper insulation to avoid short circuits.
- What are the limitations of this cooler? - It may not work effectively in very large rooms and requires regular ice replacement.



When

- When did the students start working on the project? - At the beginning of their science fair preparation.
- When will the prototype be completed? - Within a month after collecting the materials.
- When will the air cooler be tested? - A few days before the science fair to ensure its efficiency.
- When will the project be presented? - At the upcoming school science exhibition.

Where

- Where will the materials be sourced from? Recycling centers, households, and discarded electronic items.
- Where will the cooler be tested? - In different room environments to check its effectiveness.
- Where will the project results be shared? - Through school presentations, social media, and Science & Innovation Competitions.

Why

- Why is this project important? – It provides a cost-effective cooling solution for people who cannot afford expensive air conditioning.
- Why were recycled materials chosen? – To promote sustainability and reduce environmental waste.
- Why should people consider using this cooler? – It is affordable, eco-friendly, and easy to make at home.
- Why is this innovation useful in rural areas? – Because it does not require expensive equipment or high electricity consumption.

How

- How does the air cooler function? – A fan pushes warm air through ice-filled plastic bottles, cooling it before releasing it into the room.
- How will the efficiency be measured? – By recording the temperature drop in a controlled room setting.
- How will the project be funded? – Through personal contributions, school funding, or community donations.
- How will the project be improved in the future? – By integrating a solar-powered fan and better cooling elements.
- How can people assemble the cooler at home? – By following a step-by-step guide shared by the students.

Riddle 2501

What is black when you buy it, red when you use it and gray when you throw it away?

(Answers on Back Cover Inside)

Project Synopsis: Making a Low-Cost Home-Made Air Cooler Using Recycled Materials

Extreme heat is a common issue in many regions, but not everyone can afford expensive air conditioning. A group of high school students sought to address this problem by designing a **low-cost, homemade air cooler** using recycled materials. Their project aims to create an **eco-friendly and affordable** cooling solution that can be easily replicated at home.

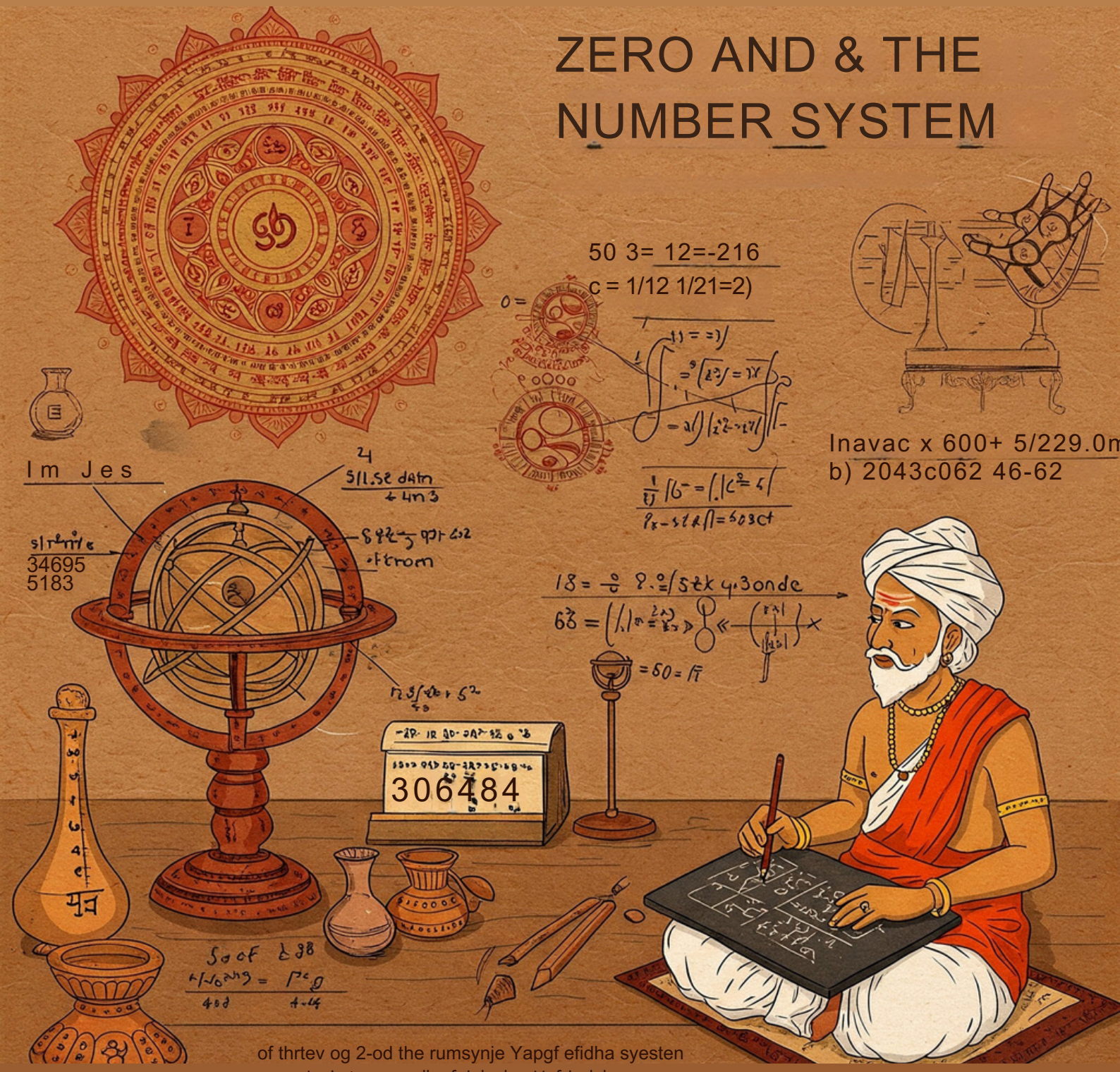
The materials used include discarded **plastic bottles, a small fan, cardboard, ice packs, and a used motor**. The cooler works by directing warm air through ice-filled plastic bottles, cooling it before it is released into the room. This simple but effective technique lowers room temperatures without consuming excessive electricity.

The students faced multiple challenges, such as ensuring sufficient airflow and maintaining cooling efficiency. They overcame these obstacles by testing different fan placements and insulation methods. Materials were sourced from recycling centers and household waste, reducing environmental impact.

This innovation is particularly useful in rural areas and low-income households. The project was tested in a controlled room environment, where it successfully reduced temperatures by several degrees. The students plan to share their findings through presentations and online guides.

Future improvements include integrating a solar-powered fan to make the cooler even more sustainable.

The Invention of Zero in Mathematics



Origins in India

The concept of zero as a numeral and a placeholder was developed in ancient India around the 5th century CE.

Indian mathematician and astronomer Aryabhata used a placeholder system to denote powers of ten in his works.

Later, Brahmagupta (598–668 CE), another eminent Indian mathematician, formalized the rules for using zero in arithmetic in his treatise, the Brahmasphutasiddhanta.

Symbol for Zero

The symbol for zero, a small dot or circle, was first seen in Indian manuscripts.

The Sanskrit word for zero is "Shunya," meaning void or empty, reflecting its philosophical and mathematical significance.

Historical Progress

1. Place Value System

- The introduction of zero enabled the place value system, a foundational concept in positional notation.
- This system allowed for efficient representation of large numbers and simplified calculations.

2. Arithmetic Operations

- Brahmagupta defined zero and established rules for its use in operations.
- Adding or subtracting zero leaves a number unchanged.
- Multiplying a number by zero results in zero.
- Dividing by zero, however, remained undefined and sparked further mathematical exploration.

3. Algebra and Calculus

- Zero enabled the formulation of equations, paving the way for algebra.
- Its role as the origin in the number line allowed the development of negative numbers and concepts like limits and derivatives in calculus.

The invention of zero (0) is one of the most transformative contributions to mathematics and human civilization. It originated in ancient India and has profoundly impacted arithmetic, algebra, calculus, and modern computing.

Philosophical and Cultural Significance

1. Concept of Nothingness

- The philosophical idea of "Shunyata" (emptiness) in Indian culture influenced the abstraction of zero as a number.
- This dual role as a numeral and a concept makes zero unique in mathematics.

2. Symbol of Balance

- In Hindu philosophy, zero is often associated with balance and the cyclical nature of existence.

Spread to the World

1. Transmission to the Islamic World

- Indian mathematical texts, including the works of Aryabhata and Brahmagupta, were translated into Arabic by scholars like Al-Khwarizmi in the 8th century.
- Zero became integral to Islamic mathematics and subsequently spread to Europe.

2. Adoption in Europe

- European scholars, such as Fibonacci, learned about zero through translations of Arabic texts.
- The Hindu-Arabic numeral system, including zero, replaced the Roman numeral system by the 15th century.

Impact of Zero

1. Scientific Advancements

- Zero is foundational to the binary system used in computers, laying the groundwork for modern technology.
- It has enabled advancements in physics, engineering, economics, and many other fields.

2. Simplifying Calculations

The concept of zero made complex calculations simpler, leading to a more profound understanding of mathematics.

3. Innovation and Creativity

Zero is often considered the epitome of innovation, representing how abstract ideas can drive practical advancements.

Conclusion

The invention of zero is one of India's greatest intellectual contributions to the world. It transformed mathematics, enabling the development of sophisticated scientific and technological systems.

Beyond its mathematical applications, zero symbolizes the power of human creativity and the ability to derive profound insights from seemingly simple ideas.

Science & Innovation Organization

MP Council of Science & Technology

The Madhya Pradesh Council of Science & Technology (MPCST) is an autonomous organization under the Department of Science & Technology, Government of Madhya Pradesh. Established in October 1981, MPCST plays a vital role in promoting scientific research, innovation, and technological advancements in the state. For high school students, it provides a platform to explore science beyond textbooks, offering opportunities to engage in projects, competitions, and research activities.

MPCST has several initiatives for students including research, science fairs, and encourages young innovators to contribute to scientific advancements. Programs like the MP Young Scientist Congress motivate students to think creatively and participate in real-world problem-solving.

- Science Competitions – High school students can enter state-level and national science contests, showcasing their talent and innovation.
- Internship and Project Guidance – The council provides mentorship to students who wish to conduct research or develop science projects.
- Scholarship and Recognition – Outstanding young scientists receive awards and scholarships to pursue careers in S&T.
- Skill Development in STEM – Training are given on coding, robotics, biotechnology, and environmental science to prepare students for future scientific challenges.

Contact Address

M.P. Council of Science & Technology, Vigyan Bhawan, Nehru Nagar, Bhopal – 462 003

Phone: (0755) 2433142 *** Email: thabib@mpcost.nic.in *** Website: www.rsbhardawaj@mpcost.nic.in

National Science Day

National Science Day is observed on February 28th every year in India to commemorate the discovery of the Raman Effect by Nobel Laureate Dr. C.V. Raman in 1928.

There is a Theme for the celebrations each year. In 2024, it was "Indigenous Technologies for Viksit Bharat" and the theme for 2025 is "Empowering Indian Youth for Global Leadership in Science & Innovation for Viksit Bharat".

Schools and Colleges organize Science Exhibitions, Paper Presentations, Quizzes, Poster Competitions, etc. celebrating the spirit of Science and inspire students towards Innovation.

Digital Health Locket Project

Anahita has developed a unique and innovative idea that involves creating lockets with QR codes. These lockets are designed to provide essential information about a person in case of an emergency, making it easier for others to identify them and contact their family members. These lockets can be particularly useful in situations where someone has an accident or is unable to communicate their details. By scanning the QR code on the locket, individuals can access a wealth of information about the person wearing it, including their personal details and emergency contact information.

This ensures that timely assistance can be provided and the person's loved ones can be informed promptly. In the case of infants, Anahita's idea takes it a step further by incorporating their parents' information and vaccination records into the locket. This makes it particularly valuable for schools, where the lockets can be implemented as ID cards. In addition to serving as identification, the lockets provide important medical information for the child, ensuring that school staff have immediate access to vaccination records and contact details for parents in case of any emergencies.

Anahita Chaturvedi

6th Class

(Source: INSPIRE MANAK NLEPC 2023 Booklet)

Safe Female Seat for Two Wheeler Vehicle

Rudransh witnessed his aunt misbalancing from the bike due to having both legs on one side and sustaining fatal injuries.

He decided to tackle this issue in order to create a society in which all women could ride comfortably.. He devised a seat with back supports on two sides that can be locked to prevent movement.

Older people, pregnant women and people with disabilities can use this, regardless of their gender. These safeguards are the most thoughtful acts of all as they can save lives.

Rudransh

6th Class

(Source: INSPIRE MANAK NLEPC 2023 Booklet)

Digital Public Infrastructure (DPI)

UPI and Aadhaar – India's Digital Revolution

What is DPI?

Digital Public Infrastructure (DPI) refers to the essential technology systems that help people access services like banking, identity verification, and online transactions. In India, Aadhaar and Unified Payments Interface (UPI) are two major DPI systems that have changed how people live and transact.

Aadhaar: India's Digital Identity

✅ What is Aadhaar?

Aadhaar is a 12-digit unique identification number given to every Indian citizen. It is linked to biometric data (fingerprints and iris scan) and is used as a digital identity for various services.

✅ How does Aadhaar help?

- Helps people open bank accounts easily.
- Ensures government subsidies (like scholarships and ration benefits) reach the right people.
- Reduces fraud by verifying identity quickly.

AADHAAR

UPI

UNIFIED PAYMENTS INTERFACE

UPI: India's Digital Payment Revolution

✅ What is UPI?

UPI is a real-time payment system that allows instant money transfers between bank accounts using a smartphone. With UPI, people can send and receive money without needing cash or a debit card.

✅ How does UPI help?

- Makes payments easy using apps like Google Pay, PhonePe, Paytm, and BHIM.
- Allows people to pay small vendors, shopkeepers, and even friends instantly.
- Reduces the need for carrying cash and makes transactions safer.

Why is DPI Important for India?

DPI like Aadhaar and UPI has made daily life more convenient:

✓ Financial Inclusion: Even small businesses and rural communities can now access banking and digital payments.

✓ Transparency: Reduces corruption and ensures direct benefit transfers.

✓ Ease of Use: Anyone with a smartphone can use these services.

Conclusion

Aadhaar and UPI have transformed India into a digital-first economy, making payments and identity verification faster, easier, and more secure. As students, understanding DPI helps you prepare for the future, where digital services will play an even bigger role!

Science & Innovation News

Satellite Docking Milestone: In January 2025, the Indian Space Research Organisation (ISRO) achieved a historic feat by successfully docking two spacecraft in orbit, making India the fourth nation to accomplish this. This success underscores India's growing capabilities in space technology and its ambitions for future complex space missions.

Funding for Space Startups: In October 2024, the Indian government approved a ₹10 billion ($119 million) fund to support the burgeoning space sector. This initiative aims to assist 40 startups, fostering innovation and accelerating India's presence in the global space market.

Rashtriya Vigyan Puraskar: In August 2024, the Government of India introduced the Rashtriya Vigyan Puraskar to honor outstanding contributions in science, technology, and innovation. The inaugural Vigyan Ratna Award was bestowed upon biochemist Govindarajan Padmanabhan for his pioneering work on the malaria parasite.

Technological Infrastructure

Digital Science Park in Kerala: April 2023 marked the commencement of India's first Digital Science Park in Thiruvananthapuram, Kerala. This state-of-the-art facility aims to support research and development in digital technologies, fostering collaboration between academia, industry, and government.

Science & Innovation Competitions to Watch

ANUSANDHAN NATIONAL RESEARCH FOUNDATION (ANRF)

Anusandhan National Research Foundation (ANRF) - established through an Act of Parliament: ANRF Act, 2023, to provide high-level strategic directions for research, innovation, and entrepreneurship in the fields of natural sciences, including mathematical sciences, engineering and technology, environmental and earth sciences, health and agriculture, and scientific and technological interfaces of humanities and social sciences. Anusandhan National Research Foundation (ANRF) has been established to promote research and development and foster a culture of research and innovation throughout India's Universities, Colleges, Research Institutions, and R&D laboratories. ANRF acts as an apex body to provide high-level strategic direction of scientific research in the country as per recommendations of the National Education Policy. ANRF forges collaborations among the industry, academia, research institutions and government departments.

Source: https://www.psa.gov.in/nrf

Key for Brain Teasers

Solution
Sudoku Challenge 2501

5	6	9	4	7	8	2	3	1
4	7	3	5	1	2	6	9	8
8	1	2	3	6	9	7	4	5
2	5	7	1	8	3	9	6	4
3	9	6	2	5	4	8	1	7
1	8	4	7	9	6	3	5	2
9	2	1	8	3	5	4	7	6
7	3	8	6	4	1	5	2	9
6	4	5	9	2	7	1	8	3

Solution
Word Search 2501

I	T	A	W	M	A	J	H	Y	L	E	C	N	X	R	C	Z
D	H	O	F	C	L	U	E	Q	P	R	A	T	O	M	L	E
O	E	I	D	M	A		P	H	Y	S	I	C	S	Y	H	D
C	R	Z	J	O	B	U	K	B	T	F	C	R	J	W	U	A
K	M	I	C	R	O	S	C	O	P	E	C	Y	L	P	F	T
O	O	W	E	U	R		V	B	J	K	O	S	H	A	W	A
R	M	T	B	A	A	T	S	C	I	E	N	C	E	R	V	N
G	E	E	F	U	T	K	P	S	P	H	R	B	T	T	C	A
A	T	D	C	M	O	B	L	Y	C	E	L	L	C	I	P	T
N	E	X	P	E	R	I	M	E	N	T	M	Y	H	C	L	O
I	R	W	H	P	Y	H	R	Q	W	U	G	P	E	L	A	M
S	O	R	E	S	E	A	R	C	H	N	R	F	M	E	C	Y
M	A	G	T	V	F	M	Y	I	T	V	A	G	I	D	E	G
A	R	N	K	B	E	A	K	E	R	S	V	G	S	C	B	X
F	M	A	G	N	E	T	I	S	M	L	I	I	T	S	O	G
G	H	A	F	L	A	S	K	K	V	X	T	M	R	V	S	O
B	G	M	N	B	I	O	L	O	G	Y	Y	M	Y	W	C	F

Riddle 2501 Answer

Charcoal

Riddle 2502 Answer: 1. Ice 2. Water 3. Wetlands 4. Salt

Pi Day - March 14

Pi Day is celebrated on March 14th in India, as it is around the world, to honor the Mathematical Constant **pi** (**π**). The date 3/14 resembles the first three digits of pi (3.14).

Why celebrate Pi Day?

To celebrate the beauty of Math and its applications, to recognize the importance of **pi** in Math, Statistics, and Physics and to commemorate the constant value of **pi** and how it simplifies calculations

How to celebrate Pi Day?

Eat pie, participate in **pi** recital contests, Host a pie party, and Parade around a Pi Shrine waving the digits of **pi**.

Pi in real life

Pi is used in many calculations in Math, Physics, and Statistics. It's used by NASA to explore space.

Young Scientist India

A Science & Innovation Magazine for School Students

Avishkar Awards 2024

Elocution Competition

Science Models Exhibition

Guru Puraskar Awards

Quiz Master Bhanu

www.youngscientistindia.org