February 2025

Young Scientist India

A Science & Innovation Magazine for School Students

www.youngscientistindia.org

Innovation Thrust in India

DR. UDBHAB BHARALI

DR. JASBIR SINGH BAJAJ

DR. UDIPI RAMACHANDRA RAO

DR. KAMNIO CHATTOPADHYAY

PARATO ANALYSIS

FLOWCHARTING TECHNIQUE

WHAT IS INNOVATION?

INDIAN INNOVATION: PLASTIC SURGERY

Volume 01 - Issue 02

Young Scientist India

Table of Contents

Editorial

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Chairman's Message

Hello, Young Scientists.

How was the inaugural issue of the Young Scientist Magazine? I loved it. It was a proud feeling to know about our Indian Scientists, Indian Science Organizations, Great Innovation Labs, and Indian Inventions. Brainstorming and 5W's & 1H Techniques were two beautiful Training Modules, not just for Science and Innovation Projects, but are helpful throughout our lives. They are helpful to me all the time. And, there were Inspiring Innovations from students like you. The Cover Story on Grassroots Innovations was insightful and the invention of Zero was heartening. All in all, it was pretty satisfying for such a good start.

Here I am more excited about this month's issue which is loaded with more inspiring stories on our Proud Indian Scientists, Indian Inventions and Innovations, as well as Indian Labs and Organizations. Great work is being done across the country. I would like you to observe, learn about them, take inspiration, and aspire to be a part of this Innovation Journey. Life becomes more joyful when you go beyond textbooks and syllabus.

This month too, there is an insightful cover story on Innovation Thrust in India. You can learn about more Indian Scientists and Innovations. We brought you two handy tools that help improve efficiency and save time in projects. Pareto Analysis is a nice little technique in slicing and dicing problems and their root causes. And, when you want to understand how a system works or intend to explain how your innovation delivers the results, Flowcharting is an excellent technique to adopt. You would be amazed to see how simple and clear the communication could be. Do have a look at the sample flowcharts given there to experience it yourself.

While the Young Scientist India team celebrates this progress, I suggest that you too share your happiness with your friends by referring to this Digital Magazine. Even the previous issues would be available on the website not to miss earlier capsules. All the best and keep innovating for an Atmanirbhar Bharat.

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YSI Magazine Subscription Form

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Invitation to the Writers

Young Scientist India Magazine invites Educators, Teachers, Writers, and Enthusiasts to write Science and Innovation related articles for Indian High School Students and Teachers.

Register your details through the link: YSI Mag Writers Registrations From

or you may also contact Mr. Kiran on 9985592223 and Ms. Padma on 9966775534.

Taap Rakshak Fireproof Material

A quest to find a fire-proof material led me to starch, which is fire and heat-resistant. Further experimentation revealed that mixing it with glue not only increases the binding strength of starch but also increases its resistance to heat and fire. Adding baking soda further improves its anti-fire properties. Later, adding appropriate quantities of urad dal, edible gum, marble powder, lime powder and synthetic glue gave promising results.

Aarush Nag
9th Class

Testing Methods: Scenario 1: Place a sheet of Taap Rakshak over a cardboard house stuffed with cotton. Now, on igniting, the house and cotton burn but the fire-proof sheet neither catches fire nor heats up. Scenario 2: Crack an egg into a bowl made of Taap Rakshak and light a fire underneath the bowl. After sufficient time to cook, the egg remains raw, which proves the bowl protected it from heat. Scenario 3: An Iron bar coated with Taap Rakshak when placed in fire, doesn't melt or deform.

(Source: GYS Avishkar Awards 2023 Booklet)

Artificial Moisture Controlled Fruit Ripening Device

AMCERD-F is a device that naturally ripens fruits from inside and outside at the required temperature without harming people's health. It is made of an old wooden mango box installed with a bulb as the heating element, a cooling fan with honeycomb pads and a motor. The cooling system works on the simple desert cooler principle. These temperature-maintaining elements are controlled with the help of a temperature-controlling sensor. In addition, insulating materials are also installed. It is made up of three layers. The first is a mixture of soil, husk and sawdust.

Lakshya Raj Singh Thakur
11th Class

The Second layer is "Fruit Peel Paper", a special paper prepared and tested to absorb the extra moisture content in the internal environment of the device preventing any growth of fungus. Multiple layers of fruit peel paper are also used as trays inside the device so that the extra moisture released by the fruits placed on it can be absorbed.

(Source: GYS Avishkar Awards 2023 Booklet)

Indian Scientist

Dr. Jasbir Singh Bajaj

A Visionary Scientist in Agricultural Biotechnology

26 SEPTEMBER 1936 - 08 JANUARY 2019

Dr. Jasbir Singh Bajaj was a renowned Indian physician and diabetologist whose contributions to medical science and healthcare policy were profound. He was honored with all three Padma awards: Padma Shri (1981), Padma Bhushan (1982), and Padma Vibhushan (2009), making him one of the few individuals to achieve this distinction.

- Medical Contributions: He specialized in endocrinology and metabolic medicine.
- He conducted extensive research on diabetes management, particularly in understanding the metabolic and hormonal changes associated with the disease. His work helped improve treatment protocols for diabetic patients.
- Dr. Bajaj explored various aspects of endocrine disorders, contributing to advancements in diagnosing and managing conditions like thyroid dysfunctions and adrenal disorders.
- Academic Leadership: Dr. Bajaj served as a professor and head of medicine at the All India Institute of Medical Sciences (AIIMS), New Delhi, and was instrumental in shaping medical education. He was a Fellow of the Royal College of Physicians of London and Edinburgh, as well as a Fellow of the National Academy of Medical Sciences.
- Government Roles: He served as Honorary Physician to the President of India (1977–1982, 1987–1992) and Consultant Physician to the Prime Minister (1991–1996).
- Policy Contributions: As a member of the Planning Commission of India (1991–1998), he played a key role in health policy planning and improving healthcare delivery systems.
- International Recognition: Dr. Bajaj was conferred an Honorary Doctorate in Medicine by the prestigious Karolinska Institute, Stockholm, Sweden, in 1985. He was the first scientist from outside Europe and the USA to be elected President of the International Diabetes Federation (1985–1988). After his term, he was honored as the Federation's Honorary President for life.

Dr. Bajaj's work has had a lasting impact on the field of medicine, particularly in diabetes and endocrinology. He advanced medical research and healthcare in India. His career was filled with numerous achievements and contributions that left a lasting impact on medicine and healthcare.

Cover Story

Innovation Thrust in India

Cover Story

Innovation Thrust in India

Innovation is the driving force behind progress, shaping the future with groundbreaking ideas and solutions. India, with its diverse talent pool and rich cultural heritage, is on the brink of a transformative era. The Prime Minister's dream of Viksit Bharat by 2047 is to be achived by 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. High school students in this dynamic nation have a unique opportunity to be at the forefront of innovation. This article explores India's innovation landscape, key initiatives, and how young minds can contribute to and benefit from this movement.

The Importance of Innovation

Innovation extends beyond creating new technologies—it involves critical thinking, problem-solving, and improving lives. In a rapidly evolving world, the ability to innovate is crucial for staying relevant. India's vast population and unique challenges present endless opportunities for innovative solutions in areas like healthcare, education, and environmental sustainability.

Government Initiatives Fueling Innovation

The Indian government has been implementing various initiatives to promote research, development, and entrepreneurship. Department of Science & Technology and NITI Ayog are in the forefront of these effots. States have Councils on Science & Technology.

- **Start-up India:** Launched in 2016, this initiative provides financial assistance, mentorship, and a conducive business environment for entrepreneurs.
- **Make in India:** Encourages local manufacturing and technological advancements to reduce reliance on foreign products & boost economic growth.
- **Atal Innovation Mission (AIM):** A NITI Aayog initiative promoting innovation through Atal Tinkering Labs (ATLs) in schools and Atal Incubation Centers (AICs) in universities and industries.
- **National Innovation Foundation (NIF)**: Supports grassroots innovations, ensuring rural and small-scale inventors receive proper recognition and resources.
- **Digital India**: Aims to transform India into a digitally empowered society by improving internet access, digital literacy, and e-governance services.
- **Anusandhan National Research Foundation (ANRF)**: ANRF provides high-level strategic directions for research, innovation, and entrepreneurship in the fields of natural sciences, mathematical sciences, engineering and technology, environmental and earth sciences, health and agriculture, and scientific and technological interfaces of humanities and social sciences. ANRF promotes a culture of research and innovation through Universities, Colleges, Research Institutions, and R&D laboratories. ANRF forges collaborations among the industry, academia, research institutions and government departments.

Key Sectors Driving Innovation

Several sectors in India are at the forefront of innovation.

- **Space Technology:** ISRO's achievements, including Chandrayaan-3, Mangalyaan, and Gaganyaan, highlight India's growing expertise in cost-effective space exploration.
- **Healthcare & Biotechnology:** Innovations in vaccine development, affordable medicines, and medical devices have positioned India as a leader in global healthcare solutions.
- **Renewable Energy:** India's commitment to achieving 500 GW of renewable energy capacity by 2030 underscores its focus on sustainability through solar, wind, and hydroelectric power.
- **Artificial Intelligence & Automation**: AI-driven advancements are transforming industries, with Indian startups and tech firms developing smart applications in healthcare, education, and finance.

Role of High School Students in Innovation

High school students are at the forefront of India's innovation drive, as they are encouraged to explore creativity and problem-solving from an early age.

Schools and universities promote innovation through hackathons, science fairs, and technology challenges. There are Innovation Labs, Science Clubs, Exclusive Social Media Channels, Magazines, and many National and International Competitions. Some of the most effective ways high school students can contribute to innovation include:

- **Participation in Atal Tinkering Labs (ATLs)**: These labs provide students with hands-on experience in robotics, 3D printing, artificial intelligence, and electronics, encouraging them to develop solutions for real-world problems.
- **Science and Technology Competitions**: INSPIRE MANAK, GYS Avishkar Awards, NCSC, ATL Hackathons, School Innovation Marathon, ISRO Yuvuka, EMDP, Koushal, are some of the 40+ Competitions in India promoting Innovation among High School Students. Platforms such as the India Science Festival (ISF), IISF, National Science Fair, Intel IRIS Science Fair, and Google Science Fair offer opportunities for young innovators to showcase their ideas.
- **Coding and App Development**: Many students are learning coding and developing mobile applications to solve everyday issues. For example, a group of Indian students developed an AI-based app to assist visually impaired individuals.
- **Environmental Innovation Projects**: Students across India are working on sustainable projects such as water conservation, plastic recycling, and renewable energy solutions. A notable example is a group of school students in Maharashtra who designed a solar-powered irrigation system for farmers.
- **Young Entrepreneurs**: With the rise of online platforms and mentorship programs, high school students are launching their own startups. For example, a teenager from Chennai developed a smart helmet that alerts emergency services in case of an accident.

Inspiring Young Innovators

Thousands of young minds in India have already made significant contributions to innovation. GETA Young Scientist Program Team compiled over 8500 Student Innovations available in the public domain and made available on a Telegram Channel named **Innovation Projects India** for reference as well as inspiration. Here are a couple of such student innovations...

- **Rifath Sharook:** Developed the world's lightest satellite, which was launched by NASA.
- **Harshwardhansinh Zala**: Designed a drone to detect and neutralize landmines.
- **Vinisha Umashankar**: A high school student who designed a solar-powered ironing cart to reduce carbon emissions.

Challenges and the Road Ahead

Despite rapid progress, India faces several challenges:

- **Limited Research Funding:** Many research projects struggle due to inadequate funding and infrastructure.
- **Brain Drain:** Talented individuals often move abroad for better opportunities.
- **Industry-Academia Gap:** Stronger collaboration between educational institutions and industries is essential for fostering innovation.
- **Digital Divide:** Unequal access to technology and the internet in rural areas hampers innovation.

Addressing these challenges requires increased investment in research, a robust educational ecosystem, and incentives for young innovators.

Conclusion

India's innovation thrust is driving the nation towards self-reliance and global leadership. With continued government support, technological advancements, and the enthusiasm of young minds, India is well on its way to becoming a powerhouse of innovation.

High school students should embrace curiosity, think outside the box, and contribute to India's journey towards Atmanirbhar Bharat. Schools and Teachers need to adapt the change and put efforts towards multi-lateral development of students aligning to the National Education Policy 2020.

The Union Government through DST, NITI Ayog, and various Ministries are giving direction and budgets promoting Innovation. States have Councils on Science & Technology, R&D Labs, Centers of Excellence, Incubation Centers, and Industry Collaborations. Institutes and Teachers can utilize these opportunities empowering its youth to shape a brighter and more prosperous tomorrow.

Life Saving System

Gas cylinder explosions in kitchens have become a common occurrence these days. Despite the fact that it is a highly inflammable gas, many people tend to ignore its odour, which can lead to catastrophic consequences. In Dharavi, Mansi, recently witnessed a gas explosion that resulted in the loss of many lives and extensive damage to property. Firefighters have shared guidelines on what to do in case of a cylinder fire. However, prevention is always better than cure. To prevent further accidents, she has come up with an innovative solution – a modified gas stove with an alarm system that can detect gas leakage.

Mansi Ramesh
9th Class

The alarm will ring as soon as the regulator is switched on until the gas stove is lit, alerting us to any potential gas leaks. This feature can be especially useful in situations where the flame goes out due to milk spilling or wind, among other scenarios.

(Source: INSPIRE MANAK NLEPC 2023 Booklet)

Multi Purpose Chair

Khusbu's idea focuses on the development of a multipurpose chair designed to assist physically disabled individuals, older people, and children facing mobility challenges. The chair serves as a practical solution for both hospitals and houses, providing support for various daily activities. The multipurpose chair aims to address difficulties related to walking, sitting, and going outdoors that are commonly experienced by disabled and elderly individuals. Her idea model emphasizes the importance of improving their quality of life and making everyday tasks easier for them.

This idea aims to enhance the independence and comfort of physically disabled individuals, older people, and children, providing them with a versatile and affordable solution to overcome mobility challenges in various settings.

Khusbu Sahu
9th Class

(Source: INSPIRE MANAK NLEPC 2023 Booklet)

Science & Innovation Lab

Council of Scientific and Industrial Research

CSIR is one of India's largest and most prominent research organizations, with over 40 institutes across the country, dedicated to advancing knowledge and innovation in various fields. Its mission is to contribute to India's economic, industrial, and social development through cutting-edge research and development (R&D).

Key Areas of Focus

- **Health & Pharmaceuticals:** CSIR is crucial in developing affordable medicines and vaccines for diseases like tuberculosis and malaria. Notable breakthroughs include the non-steroidal family planning pill, Saheli, and the herbal asthma pill, Asmon.
- **Energy & Environment:** Focused on renewable energy (solar, wind, bioenergy) and sustainable environmental practices, CSIR works to enhance energy efficiency and combat climate change.
- **Aerospace & Defense:** In collaboration with the Indian defense sector, CSIR contributes to air defense systems, radar technology, and aerospace materials.
- **Agriculture & Food Technology:** CSIR's agricultural research aims to increase crop yields, improve soil health, and develop sustainable farming practices, while also advancing food processing technologies.
- **Water Resources & Climate Change:** CSIR addresses critical issues like water conservation, climate change adaptation, and disaster management through innovative solutions.

Major Achievements

- Developed India's first synthetic drug in 1950.
- Invented Swaraj, India's first indigenous tractor, in 1967.
- Pioneered the first transgenic Drosophila model for cancer drug screening.
- Developed SARAS, India's first indigenous 14-seater aircraft.

Technology Transfer & Innovation: CSIR collaborates with industries to translate research into commercial products. It supports the startup ecosystem, driving innovation and entrepreneurship.

Education & Training: CSIR offers academic programs, fellowships, and research opportunities to promote science education and inspire future innovators.

Shanti Swarup Bhatnagar Prize: Since 1958, CSIR has awarded the prestigious Shanti Swarup Bhatnagar Prize to Scientists recognizing their outstanding contributions in S&T.

National & Global Impact: CSIR's work has significantly impacted India's economic growth, especially in healthcare, energy, and manufacturing. It collaborates globally, contributing to scientific advancements worldwide.

CSIR continues to lead in scientific and industrial innovation, shaping India's future in science and technology. It offers high school students exciting opportunities in research and innovation, fostering growth in science and technology.

website: www.csir.res.in

Indian Scientist

Dr. Udipi Ramachandra Rao

The Satellite Man of India, Pioneering Indian Space Scientist

10 MARCH 1932 - 24 JULY 2017

Udupi Ramachandra Rao was born in Adamaru, Karnataka. He completed his early education in Adamaru and Udupi. Rao earned a B.Sc. from Madras University in 1952, an M.Sc. from Banaras Hindu University in 1954, and a Ph.D. from Gujarat University in 1960 under the guidance of Vikram Sarabhai.

Career at ISRO: Rao joined the Indian Space Research Organization (ISRO) in 1963, where he played a pivotal role in shaping India's space journey. He became the Chairman of ISRO in 1984 and held this position until 1994. Under his leadership, ISRO reached numerous milestones in space science and technology, making India a global player in space research.

Key Contributions

- **Aryabhata Mission** (1975): Rao played a critical role in launching Aryabhata, India's first satellite, marking the country's entry into space exploration.
- **INSAT** (Indian National Satellite System): His work on INSAT revolutionized India's telecommunications, broadcasting, and meteorology.
- **Rocket Development**: He guided the development of ASLV (Augmented Satellite Launch Vehicle) in 1992 and PSLV (Polar Satellite Launch Vehicle) in 1995, boosting India's rocket technology.
- **Cryogenic Technology**: Rao advanced GSLV (Geosynchronous Satellite Launch Vehicle) and cryogenic engine technology, allowing India to launch heavier satellites into space.

International Recognition and Awards: Rao's achievements were recognized globally, earning him several prestigious awards:

- Padma Bhushan in 1976
- Padma Vibhushan in 2017
- Bharat Ratna (posthumously in 2023)
- Yuri Gagarin Medal, Frank J. Malina Award, and Theodore Von Karman Award

He was inducted into the *Satellite Hall of Fame* in the United States in 2013, becoming the first Indian to receive this honor.

Additional Roles: Rao held several other prominent positions:

- Chairman of Antrix Corporation (ISRO's commercial arm)
- Chairman of the United Nations Committee on the Peaceful Uses of Outer Space (UN-COPUOS)
- President of the Indian Science Congress Association

NaVIC

India's Indigenous Navigation System

Introduction

India's journey toward self-reliance in satellite navigation took a giant leap with the development of NaVIC (Navigation with Indian Constellation), an independent regional navigation satellite system. Developed by the Indian Space Research Organisation (ISRO), NaVIC provides accurate positioning services over India and surrounding regions. Unlike dependence on the US-based Global Positioning System (GPS), NaVIC strengthens India's strategic and commercial capabilities in location-based services, defense applications, and disaster management.

Understanding NaVIC's Architecture

NaVIC consists of seven satellites, with three in geostationary orbit and four in geosynchronous orbit. These satellites cover India and a region up to 1,500 km beyond its borders, offering high positional accuracy.

Components of NaVIC

- **Space Segment:** The seven satellites forming the constellation.
- **Ground Segment**: Ground control centers, tracking stations, and data processing units.
- **User Segment**: Receivers that process NaVIC signals for various applications.
- **NaVIC operates in two frequencies**: L5-band (1176.45 MHz) and S-band (2492.08 MHz), ensuring greater accuracy and reliability compared to GPS, which primarily operates on a single frequency.

Key Features and Advantages of NaVIC

- **High Accuracy**: Offers positioning accuracy within 5 to 10 meters, superior to GPS in the Indian region.
- **Dual Services**:
  - Standard Positioning Service (SPS): Available for civilian users.
  - Restricted Service (RS): Encrypted service for authorized users, primarily defense applications.
- **Independent and Secure**: Operates without reliance on foreign navigation systems.
- **Regional Coverage**: Focuses on India and its neighboring areas only, unlike global systems like GPS, GLONASS, or Galileo.

Applications of NaVIC

- **Defense & Security**: Secure communication and precise targeting for military operations.
- **Disaster Management**: Helps in disaster prediction, relief coordination, and rescue missions.
- **Transportation & Navigation**: Used in railways, maritime, and road transport for real-time location tracking.
- **Agriculture & Fisheries**: Farmers and fishermen use NaVIC-enabled devices for weather forecasting and navigation.
- **Surveying & Mapping**: Supports geospatial applications, land surveys, and infrastructure planning (mapmyindia.com).
- **Commercial and Consumer Applications**: Mobile manufacturers, including Samsung and Xiaomi, are integrating NaVIC into their devices.

S&I Article

How to Define a Problem in an Innovation Project?

How to Define a Problem in an Innovation Project?

Innovation is the key to solving real-world problems and driving progress in various fields. Every great innovation begins with a well-defined problem. But how do we define a problem effectively? This article will guide you through the essential steps to identify, analyze, and frame a problem accurately in an innovation project.

Understanding the Importance of Problem Definition

Before finding solutions, it is crucial to understand what problem needs to be solved. A poorly defined problem can lead to confusion, wasted resources, and ineffective solutions. A well-defined problem helps innovators focus their efforts and increases the chances of success. It acts as a roadmap that guides the entire innovation process. There is an adage, "a problem well-defined is a problem half-solved."

Steps to Define a Problem in an Innovation Project

1. Identify the Core Issue

The first step is identifying the core issue. This requires observing the situation carefully and asking questions like:

- What is the challenge?
- Who is affected by this issue?
- Why is this a problem?
- What impact does it have on people or society?

For example, if students in a school are struggling with online learning, the core issue might be a lack of proper digital resources or internet access.

2. Research and Gather Data

A well-defined problem is based on facts and evidence rather than assumptions. Conduct thorough research by

- Collecting relevant data through surveys, interviews, and case studies.
- Observing existing solutions and their shortcomings.
- Analyzing trends and patterns related to the issue.

For instance, if an innovation project aims to improve waste management, research should include data on waste production, disposal methods, and environmental impact.

3. Narrow Down the Problem Statement

Once the core issue is identified, refine it into a clear and specific problem statement. A good problem statement should:

- Be specific and focused.
- Clearly define the affected group or stakeholders.
- Avoid suggesting solutions at this stage.

For example, instead of saying, "We need a better recycling system," a more refined problem statement would be, "Many households in urban areas lack easy access to recycling facilities, leading to increased waste pollution."

4. Frame the Problem Statement

A well-structured problem statement should cover answers to What, Where, Who, When, and possibly Why and How it is occurring.

Example: "Farmers in drought-prone regions struggle with low crop yields due to inadequate irrigation methods, leading to food shortages and economic instability."

GYS SAMASYA KHOJ Contest

A National Problem Identification Competition for High School Students

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.

GYS Samasya Khoj 2025 Contest

The objective is to identify real life contemporary problems in India that impact an individual's living standard, improve a business outcome, increase agricultural productivity, or better the resource saving potential. Here are a few examples...

- Students in high schools are not drinking enough water and often become dehydrated.
- Passengers on Railway Platforms are often unable to see the green signal at the front of the train, board a moving train, and meet with accidents.
- The chalk piece dust that emanates while erasing blackboards in classrooms causes allergy and health issues to teachers.
- Elders slip and rolldown speedily when they fall on stairs.

A problem may have an impact on an individual, tens of people, or even hundreds and more. A problem may be in a rural context, urban area, or universal. A problem may be local to a person or family, of the village, town, district, state, or even at national level. A problem may be happening at home, in the farm, at an office or workplace, in a factory, in a public place, or universal. A problem may have occurred once, happening occasionally, or frequently. A problem may pose a risk to the lives of people or animals. And, a problem may cause loss of a few Rupees, thousands, or lakhs and more.

All the problems submitted here would be published on GETA Young Scientist Program website for appreciation as well as public use.

Theme: Real-life Problems relevant to Student Innovation

Submissions: www.youngscientistindia.org

Last Date for Submission: 20-May-2025

Prizes

First Prize: Rs. 3,000, Certificate, Medal
Second Prize: Rs. 2,000, Certificate, Medal
10 Consolation Prizes: Rs. 500, Certificates

Competition Terms & Conditions

- Students from Class 6 to Class 12.
- Students from Government, Aided, Corporate and Private Schools in India can participate.
- One student can submit multiple entries.
- Entries submitted should be Student's own, and should not copy from someone else or from the Internet.
- Language for submission is English.
- There is NO ENTRY FEE to participate.
- Prize distribution would be virtual. Cash Vouchers and Digital Certificates would be distributed via email. Print Certificates would be sent via Post/Courier.

  Visit website for more details.

Evaluation Criteria (100 Points)

20 points = Problem Title
30 points = Problem Description
10 points = Affected Audience
20 points = Quality of Submission
20 points = Relevance to Student Innovation.

Department of Science & Technology Government of Sikkim

The Department of Science & Technology (DST), Government of Sikkim, is the state-level agency driving the development of science, technology, and innovation for Sikkim's socio-economic progress. Working under the Government of Sikkim, the DST integrates scientific and technological advancements across various sectors.

Key Objectives

- **Promotion of Scientific Research and Innovation:** Supporting research in diverse fields like environmental studies, agriculture, health, natural resources, and technology.
- **Technology Transfer and Application:** Facilitating the transfer of technology to industries and the community, addressing Sikkim's unique challenges.
- **Strengthening Science Education:** Promoting science education at all levels, fostering scientific temper and critical thinking.
- **Entrepreneurship in Science & Technology:** Supporting science and technology-based startups and SMEs.
- **Collaboration and Networking:** Partnering with national and international organizations.
- **Policy Formulation and Advisory Role:** Advising the Sikkim Government on science and technology policy.

Key Programs and Initiatives:

- **Science Popularization and Awareness Programs:** Organizing exhibitions, workshops, and lectures to raise public awareness.
- **Statewide Science and Technology Competitions:** Encouraging creativity and problem-solving skills among students.
- **Green Technology Initiatives:** Supporting projects related to renewable energy, waste management, and sustainable agriculture.
- **Research and Capacity Building:** Providing grants and support for research, particularly in emerging fields.
- **Development of Infrastructure for Science and Technology:** Establishing laboratories, research centers, and innovation hubs.

Organizational Structure

The DST is headed by a Secretary and comprises experts, scientists, and administrative staff. It collaborates with other state departments, institutions, and national agencies.

Conclusion

The Department of Science & Technology in Sikkim plays a vital role in advancing scientific knowledge, fostering innovation, and applying technology to address Sikkim's unique challenges.

S&I Article

What is Innovation

A Guide for High School Students

Introduction

Innovation is a term we often hear in classrooms, on television, and in newspapers. But what does it really mean? Simply put, innovation is the process of creating new ideas, methods, or products that improve the way we live, work, and solve problems. It is not just about inventing something entirely new but also about improving existing things to make them better and more useful.

Understanding Innovation

Innovation is all around us. Every object we use today, from mobile phones to electric vehicles, is the result of continuous innovation. Scientists, engineers, doctors, and even students contribute to innovation by thinking of new ways to solve problems. In India, young minds are encouraged to innovate through programs like Atal Tinkering Labs and science fairs.

Types of Innovation

Innovation can take many forms, but the most common types include:

- **Product Innovation:** Creating new products or improving existing ones. Example: Electric vehicles replacing petrol cars.
- **Process Innovation:** Finding better ways to do things. Example: Online learning platforms making education accessible from home.

- **Social Innovation:** Innovations that help society. Example: Affordable solar lamps for villages with no electricity.
- **Technological Innovation:** Advancements in science and technology. Example: Chandrayaan-3, India's mission to explore the Moon.

Why is Innovation Important?

Innovation is important for many reasons:

- **Solves Problems:** It helps us tackle challenges like pollution, energy shortages, and diseases.
- **Improves Quality of Life:** Better technology makes life easier and more comfortable.
- **Boosts the Economy:** Innovative businesses create jobs and contribute to India's progress.
- **Encourages Creativity:** Innovation pushes people to think outside the box and experiment with new ideas.

Examples of Innovation in India

India has a rich history of innovation. Some remarkable Indian innovations include:

- **Zero** – The number zero was invented in India, changing mathematics forever.
- **Ayurveda** – One of the oldest systems of medicine, still practiced today.
- **ISRO's Low-Cost Space Missions** – India sent a satellite to Mars at a fraction of the cost of other space programs.
- **Digital Payment Systems** – Apps like UPI and Paytm have revolutionized banking and transactions.

How Can Students Be Innovative?

Innovation is not just for scientists and entrepreneurs; students can be innovators too! Here's how...

- **Be Curious** – Ask questions about how things work, why they are the way they are.
- **Think Creatively** – Try to find new solutions to everyday problems.
- **Experiment and Build** – Participate in science projects, coding competitions, and model-making activities.
- **Learn New Skills** – Keep up with new technologies like robotics, artificial intelligence, and 3D printing.
- **Join Innovation Programs** – Take part in initiatives like Atal Innovation Mission and science exhibitions.

Conclusion

Innovation is the foundation of progress and transformation. It empowers individuals and societies to solve challenges and create a better future. Students should participate in events like INSPIRE MANAK, GYS Avishkar Awards, NCSC, ATL Hackathons, and so on to validate their ideas. Everyone, including students, can be an innovator by thinking creatively, experimenting, and embracing new ideas. Future belongs to those who innovate!

Innovation Training Module

Pareto Analysis

The 80/20 Rule of Success

What is Pareto Analysis

Pareto Analysis is a statistical technique in decision-making used to select a limited number of tasks that produce a significant overall effect. This is also known as the **Pareto Principle** and sometimes called the **80/20 Rule**. It suggests that **80% of results come from 20% of efforts,** meaning that a small portion of our actions often leads to the biggest outcomes. By understanding and practicing this principle, both Teachers and Students save time by focusing on Vital things and ignore Trivial ones. That is why, this technique is also referred to as **Vital Few and Trivial Many.**

Italian Economist **Vilfredo Pareto** introduced this concept based on his observation that 80% of Italy's wealth belonged to just 20% of the population. It was popularised by Romanian-born American Engineer Joseph M. Juran in the late 1940's.

Pareto Principle can help Teachers in **identifying the teaching strategies that have the most impact** on student learning. Instead of trying to cover everything with equal effort, teachers can focus on the **20% of lessons, activities, or teaching methods that lead to 80% of student understanding and engagement**. For example, interactive discussions or visual aids help students grasp concepts faster. Similarly, a small number of students require the majority of their attention. By recognizing these patterns, teachers can streamline their efforts, reduce stress, and create a more effective learning environment.

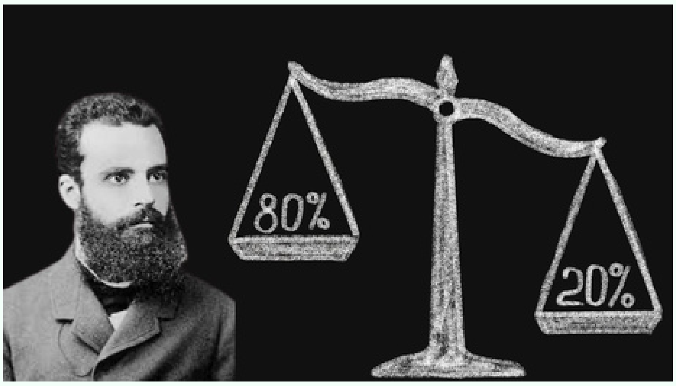
This principle is a powerful tool for students' time management. Students can focus on the most important 20% of topics that will likely contribute to 80% of their academic success, achieve better results with less effort.

For instance, understanding key formulas, concepts, or themes can help in performing well in exams.

Pareto analysis does not provide solutions to issues, but only helps identify and narrow down the most significant causes of problems based on past data. Also, be cautious that the Pareto Ratio is only a rule of thumb, and in practice, one should not expect to see this as an exact ratio.

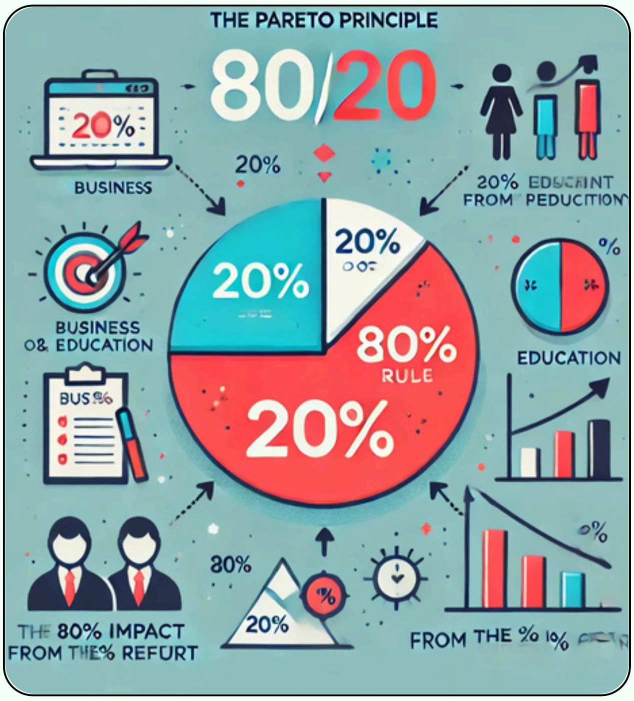
Examples of Pareto Analysis

One good way to understand the application of Pareto Principle is by looking at a few examples. Here are some real-world applications across different subjects.



- **Student Performance:** Educators may discover that 20% of students create 80% of classroom disruptions. Targeting interventions for this small group can improve overall classroom dynamics.
- **Study Techniques:** Students might realize that 20% of their study efforts lead to 80% of their learning outcomes, helping them focus on the most effective methods.
- **Identify Core Factors for Success:** Review past editions of the awards to identify the 20% of factors that result in 80% of successful and innovative projects. Create a pre-competition workshop focusing on these core factors, guiding students toward impactful topics and providing resources to kickstart their projects.

- **Optimize Resource Allocation:** Analyze which 20% of resources (e.g., advanced research materials, expert guidance) contribute to 80% of project quality. This could include partnering with local institutions to provide lab access, offering resource kits for top-performing students during initial rounds.
- **Mentor Involvement:** Identify that 20% of mentors guide 80% of winning or high-quality projects. Pair students with experienced mentors early in the process. Consider creating a "Mentor Spotlight Program" to highlight and involve the most impactful mentors, ensuring their insights are accessible to all participants.



- **Encourage Innovation Through Topics:** Past data may reveal that a small number of themes drive most impactful submissions. Curate and recommend such innovative themes. Organize brainstorming webinars to inspire topic selection, ensuring students focus on areas with high societal relevance.
- **Streamline Evaluation:** A few key evaluation criteria likely determine most of the scores (e.g., innovation, feasibility, societal impact). Design a clear strategy to maximize scores.
- **Promote Success Stories:** A handful of past winning projects might inspire the majority of new participants. Create short videos or case studies featuring these successes. Share them widely through social media, school networks, and **GETA's platform** to motivate and guide future participants.
- **Improve Registration and Participation:** Review outreach methods and identify the 20% of strategies (e.g., school partnerships, digital campaigns) that yield 80% of registrations. Focus more resources on these effective methods.
- **Enhance Student Engagement:** Identify the activities (e.g., interactive webinars, hands-on workshops) that engage 20% of participants but drive 80% of active involvement. Conduct online Q&A sessions with past winners to inspire participants. Organize virtual field trips to science labs or innovation hubs.
- **Focused Teacher Involvement:** Analyze teacher contributions and determine that 20% of teachers mentor 80% of the high-performing students. Offer rewards or recognition to these influential teachers to motivate them to guide more students effectively.
- **Special Recognition Awards:** Identify that 20% of unique project attributes (e.g., community impact, originality) lead to 80%

of audience appreciation during award ceremonies. Introduce special awards like "Most Innovative Solution" or "Best Social Impact." Involve audience voting for categories to boost excitement and engagement.

- **Regional Representation:** Participation data might reveal that 20% of regions or schools dominate 80% of submissions. Focus outreach and promotion efforts on underserved regions. Offer travel allowances or virtual participation options for students from remote areas.
- **Post-Competition Opportunities:** 20% of follow-up activities (e.g., scholarships or internships) may lead to 80% of long-term student impact. Partner with organizations or institutions to offer internships or funding for top projects. Create an alumni network for past participants to share their journeys and inspire new students.

Some more...

- **Assess Student Strengths and Interests:** Evaluate the skills, interests, and resources of students to determine the 20% who may contribute 80% of the innovative ideas. Provide them with tailored mentorship and opportunities.
- **Focus on High-Impact Activities:** Identify activities or initiatives that lead to the majority of successful innovations. For example, prioritize hackathons, project-based learning, or competitions like the Young Scientist Avishkar Awards.
- **Streamline Resources:** Allocate resources (funding, time, or mentorship) to the 20% of tools, materials, or programs that contribute the most to student innovation success.
- **Simplify Idea Validation:** Focus on the 20% of criteria (e.g., feasibility and potential impact) that validate 80% of good ideas. Simplify the evaluation process for students, so they can focus on refining their concepts.
- **Recognize and Promote Success Stories:** Identify the top 20% of student projects that inspire the majority of others. Use these as case studies to motivate and guide new participants.

Here are some more motivating examples...

- 20% of App Features = 80% of User Engagement
- 20% of Brainstorming = 80% of Innovative Ideas
- 20% of Budget = 80% of Essential Expenses
- 20% of Collaborators = 80% of Valuable Contributions
- 20% of Daily Tasks = 80% of Results
- 20% of Effort = 80% of Results
- 20% of Experiments = 80% of Breakthrough Discoveries

- 20% of Feedback = 80% of Improvements
- 20% of Focus Time = 80% of Productivity
- 20% of Ideas = 80% of Innovation
- 20% of Innovations = 80% of Functional Applications
- 20% of Interruptions = 80% of Productivity Loss
- 20% of Planning = 80% of Project Success
- 20% of Preparation = 80% of Awards Won
- 20% of Presentation = 80% of Impact
- 20% of Problems = 80% of Project Roadblocks
- 20% of Questions = 80% of Clarity
- 20% of Resources = 80% of Outcomes
- 20% of Tasks = 80% of Project Progress
- 20% of Techniques = 80% of Project Efficiency

Steps to do Pareto Analysis

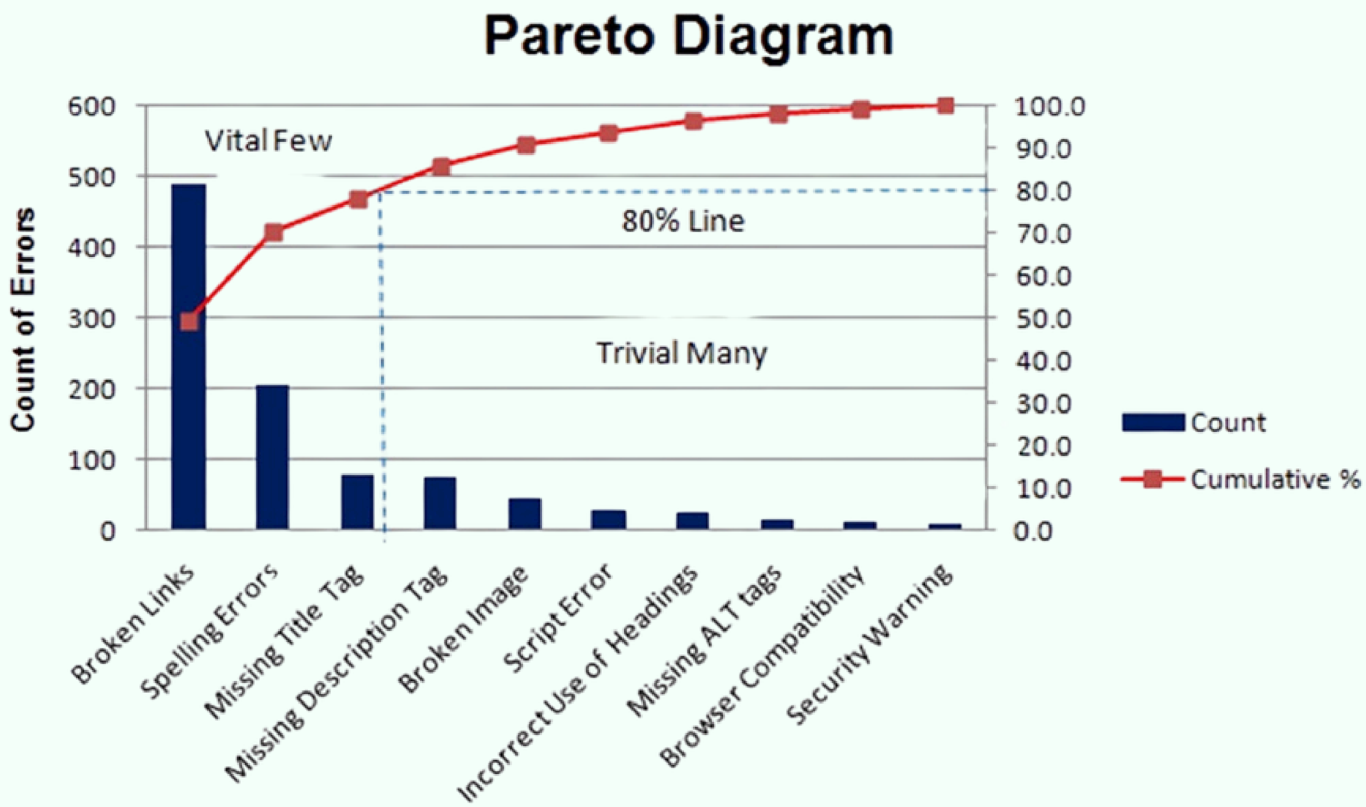
Let us look at simple steps in implementing Pareto Analysis. Let us take a business scenario.

- **Identify a list of problems:** Ideally, the list is gathered through feedback from various stakeholders like employees, clients, or customers. Common examples include anonymous complaint/feedback forms and customer surveys.
- **Identify the cause of each problem:** Why did the problem occur? Make sure to think about the root cause, which might be hidden under the surface.
- **Score each problem:** Assign a number to each problem based on the negative impact associated with it. The scoring system will depend on the type of problem trying to be solved.

Group the problems together: Group all of the similar problems together and calculate the collective scores. The problem with the highest score will most likely be the one you should try to resolve first and provide the highest return.

A common part of Pareto analysis is to graphically depict the occurrence of each variable being tracked. This depiction is called a Pareto chart. Here are steps to build a Pareto Chart.

- Create a vertical bar chart with causes on the x-axis and count (number of occurrences) on the y-axis.
- Arrange the bar chart in descending order of causes, the cause with the highest count first.
- Calculate the cumulative count for each cause in descending order.
- Calculate the cumulative count percentage for each cause in descending order. Percentage calculation: {Individual Cause Count} / {Total Causes Count}*100
- Create a second y-axis with percentages descending in increments of 10 from 100% to 0%.
- Plot the cumulative count percentage of each cause on the x-axis.
- Join the points to form a curve.
- Draw a line at 80% on the y-axis, running parallel to the x-axis. Then drop the line at the point of intersection with the curve on the x-axis. This point on the x-axis separates the important causes on the left (vital few) from the less important causes on the right (trivial many).



Example of a Pareto chart on causes for errors on websites

Summary

Pareto Analysis, also known as 80/20 Rule, is a good time-saving technique for Teachers as well as Students. It states that 20% of Efforts yield 80% of the Results. While working on Science and Innovation Projects, this concept helps focus on those 20% important subjects instead of giving equal attention to all aspects, i.e., the Vital Few over Trivial Many.

India Science Festival (ISF)

India Science Festival, popularly known as ISF, is a two-day celebration of science, technology, and innovation. It provides a platform for scientists, researchers, students, and the public to engage in popular science talks, interdisciplinary panel discussions, immersive exhibits, interactive installations, hands-on workshops, policy roundtables, book launches, film screenings and performances, we aim to bring out the excitement of science, its linkages with culture and society, and highlight its role in addressing current and future challenges.

The ISF is India's largest non-governmental event for celebrating science organized by Foundation for Advancing Science and Technology (FAST India). It is being conducted annually since 2019. Every year, there is a theme and a different venue. ISF so far was held Pune and Hyderabad on themes like *Ideas to Impact – Science for the People*, *Towards Infinity – Mind, Machines, and the Endless Frontier*, *Future is Now*, *Continuum*, and so on.

Chandrayaan-3

India's Historic Leap in Lunar Exploration

Chandrayaan-3

The successful landing of Chandrayaan-3 on the Moon marked a significant milestone for India's space program, reinforcing its status as a rising power in space exploration. Launched by the Indian Space Research Organisation (ISRO), Chandrayaan-3 aimed to achieve what its predecessor, Chandrayaan-2, narrowly missed—an impeccable soft landing on the lunar surface. On August 23, 2023, India made history as the first nation to land a spacecraft near the Moon's south pole, an unexplored and scientifically crucial region.

A Mission of Perseverance and Precision

Chandrayaan-3 was launched on July 14, 2023, aboard the LVM3 (Launch Vehicle Mark-III) from the Satish Dhawan Space Centre in Sriharikota. Unlike Chandrayaan-2, which consisted of an orbiter, lander, and rover - Chandrayaan-3 focused solely on the lander (Vikram) and rover (Pragyan) modules, eliminating the need for an orbiter since Chandrayaan-2's orbiter was still operational. This streamlined approach allowed ISRO to concentrate its resources on achieving a precise landing and conducting crucial scientific studies on the Moon's surface.

The spacecraft followed a meticulously planned trajectory, gradually maneuvering from Earth's orbit to the Moon's gravitational influence before executing a controlled descent. The primary challenge lay in ensuring a soft and stable landing, which was accomplished using cutting-edge navigation, guidance, and propulsion systems.

Exploring the Lunar South Pole

The choice of landing near the Moon's south pole was strategic. Unlike the equatorial regions explored in previous missions by other nations, the south pole holds immense scientific promise. The permanently shadowed craters in this region are believed to contain water ice—an essential resource for future lunar exploration and potential human settlements.

Chandrayaan-3's Vikram lander and Pragyan rover were equipped with advanced scientific instruments to study the lunar soil composition, analyze seismic activity, and assess surface temperature variations.

One of the primary objectives of the mission was to analyze the presence of minerals and elements, such as magnesium, aluminum, silicon, calcium, and iron.

The rover's instruments, including the Laser-Induced Breakdown Spectroscope (LIBS) and the Alpha Particle X-ray Spectrometer (APXS), provided valuable insights into the Moon's geology, helping scientists understand its evolution and potential resources.

Technological Innovations and Achievements

Chandrayaan-3 showcased India's technological prowess in multiple ways. The Vikram lander was equipped with multiple hazard detection and avoidance cameras, ensuring a safe landing. Unlike Chandrayaan-2, where the lander lost communication just before touchdown, the new mission incorporated enhanced software and redundancies to mitigate risks. The Pragyan rover, weighing 26 kilograms, was designed to traverse the lunar surface, sending back vital data to ISRO's command center.

Another remarkable achievement was the longevity of the mission. Designed for a 14-day operational period corresponding to a lunar day, the instruments continued to transmit valuable data even beyond their expected lifespan. This resilience underscored the efficiency of Indian engineering and the robustness of the spacecraft.

Impact and Future Prospects

Chandrayaan-3's success has profound implications for India's space ambitions. It reinforces ISRO's capabilities and strengthens international collaborations in lunar and interplanetary missions.

With this achievement, India has joined an elite group of nations—Russia, the United States, and China—that have successfully landed on the Moon.

The mission also serves as a stepping stone for India's upcoming lunar projects, including the Lunar Polar Exploration (LUPEX) mission in collaboration with Japan, which aims to further explore the Moon's polar regions. Additionally, Chandrayaan-3's findings will contribute to NASA's Artemis program, which seeks to establish a sustainable human presence on the Moon.

Conclusion

Chandrayaan-3 is more than just a space mission—it is a testament to India's scientific and technological advancements, perseverance, and vision for the future.

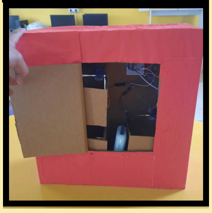
By successfully landing on the lunar surface, India has not only made history but has also paved the way for deeper space exploration, resource utilization, and global collaborations. As ISRO continues to push the boundaries of space exploration, the success of Chandrayaan-3 stands as an inspiration for future generations and a beacon of India's growing prowess in space technology.

Do you know?

The world's smallest robot is smaller than a grain of salt! These microscopic robots can be used in medicine to perform surgeries inside the human body.

MacMed

In a small village miles away from the nearest hospital, a young boy named Rohan falls ill with a high fever. His worried parents rush to find medicine, only to realize the nearest pharmacy is over 20 kilometers away. They have no choice but to wait until morning, hoping his condition doesn't worsen. This is a reality for millions living in rural areas, where access to essential medicines is scarce. Delayed medical treatment often results in serious health complications—an issue that demands an urgent solution. Imagine a world where essential medicines are available at the press of a button, even in the remotest of places. The Medicine Vending Machine Project aims to turn this vision into reality. Powered by RFID technology and Arduino, this automated system provides secure and instant medicine dispensing. A 16x2 LCD display, servo motor, and battery-operated mechanism ensure smooth and efficient functioning.



Sanjana V
9th Class

Using an RFID card, a patient can easily access pre-approved medicines without needing a pharmacist, reducing dependency on human resources and making medicine available 24/7. This innovation is not just for rural areas—it can also serve hospitals, emergency clinics, and pharmacies, ensuring that medicines are available whenever and wherever needed. With reduced waiting times and minimum human intervention, it enhances efficiency, security, and accessibility in healthcare. By deploying Medicine Vending Machines, we can revolutionize healthcare distribution.

(Source: GYS Avishkar Awards 2023 Booklet)

Water Wiper

The student from Madhya Pradesh, developed a multipurpose wiper, very handy for cleaning floors and a small container also attached to the wiper. The squeeze comes with a container for sprinkling water. The water could be wiping and don't leave any water marks after scraping. which has a small container of water attached to the wiper.

Due to which water will not have In addition, it is equipped with a spray tool, while cleaning, by pressing the spray tool, water can be dropped on the floor from the tap near the wiper.

This integrated spray cleaner removes stains from standing water and synchronizes water spray and wipes to clean the floor quickly and easily.

Deepti Shukla
8th Class

(Source: INSPIRE MANAK NLEPC 2023 Booklet)

Indian Scientist

Mr. Kamnio Chattopadhyay

Renowned Indian Materials Engineer

Born 3 March 1950

Kamanio Chattopadhyay is an Indian materials engineer and honorary professor at the Indian Institute of Science (IISc), Bengaluru. He is best known for his groundbreaking work in materials science, particularly in the discovery of decagonal quasicrystals, along with collaborators L. Bendersky and S. Ranganathan. His research has had a lasting impact on various fields, from nanocomposites to high-temperature alloys.

Achievements

Decagonal Quasicrystals: Chattopadhyay's major contribution is his discovery of decagonal quasicrystals in 1985. These materials have a unique atomic structure that do not repeat in a regular pattern, unlike traditional crystals.

Nanocomposites: His work on nanocomposites — materials that combine nanoparticles within a matrix — has led to materials with superior properties like enhanced strength, thermal conductivity, and electrical conductivity.

Research Areas

- **Phase Transformations:** Chattopadhyay studied how materials change their structure under different conditions, which is important for developing materials that can withstand extreme environments like space.
- **High-Temperature Alloys:** He developed alloys that maintain strength and stability at high temperatures, which are used in industries like aerospace and automotive engineering.
- **Bulk Metallic Glasses:** His research on metallic glasses — materials that are strong but also ductile — has led to innovations in manufacturing and engineering.
- **Nanostructured Materials:** His work in nanostructured materials, which are materials with structures on the nanometer scale, has contributed to advancements in electronics and optics.

Honors and Awards

- **Shanti Swarup Bhatnagar Prize:** He received India's highest honors for scientific research in 1995.
- **Lifetime Achievement Award:** In 2011, he was recognized by the Electron Microscope Society of India for his work in electron microscopy.

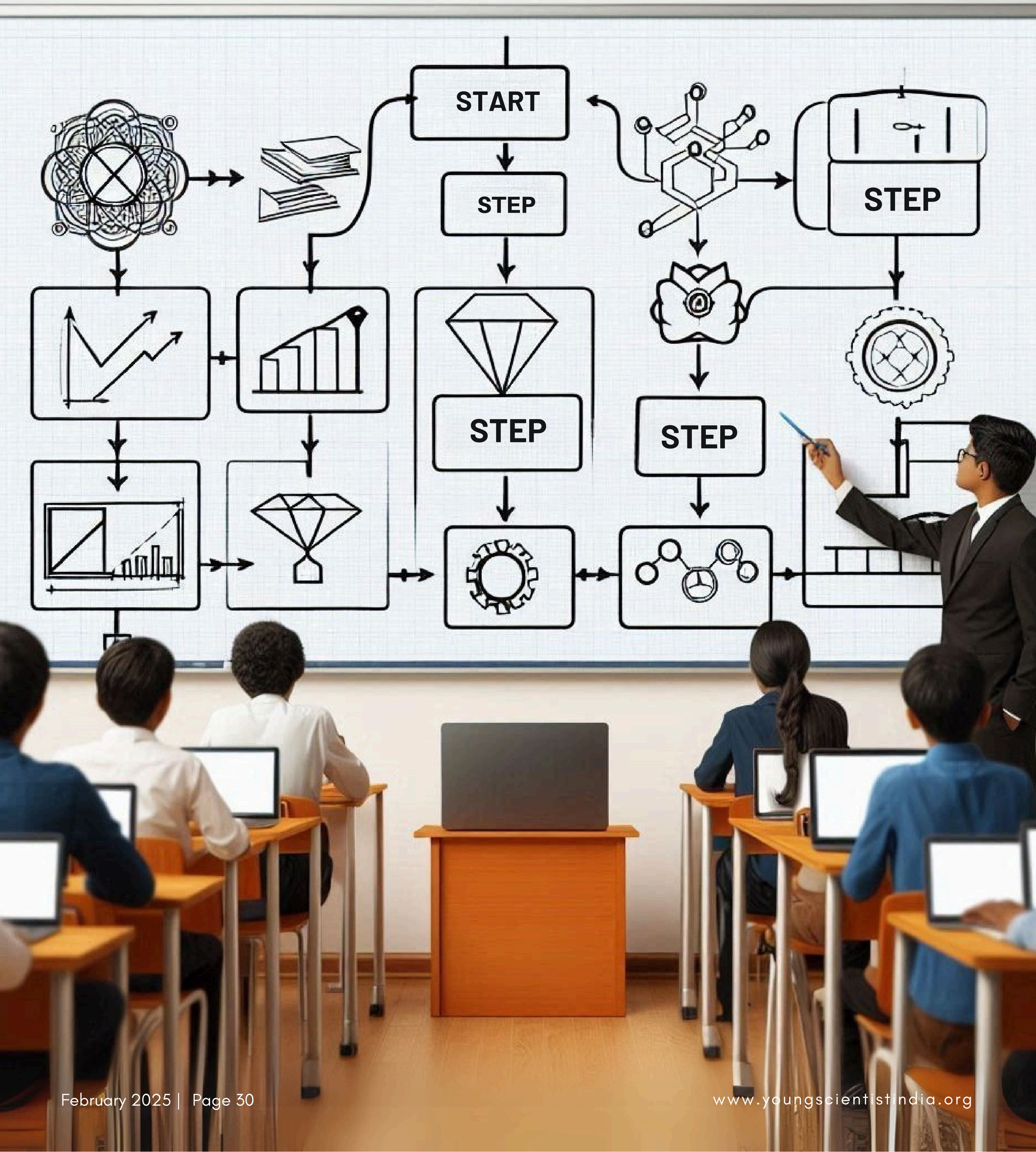
Chattopadhyay has published numerous scientific articles and books. He holds several patents related to advanced materials like high-impact solder alloys and nickel-aluminum-zirconium alloys.

Aluminum-Based Nano Eutectics is a book he authored.

Innovation Training Module

Flowcharting Technique

Your Articulation Tool

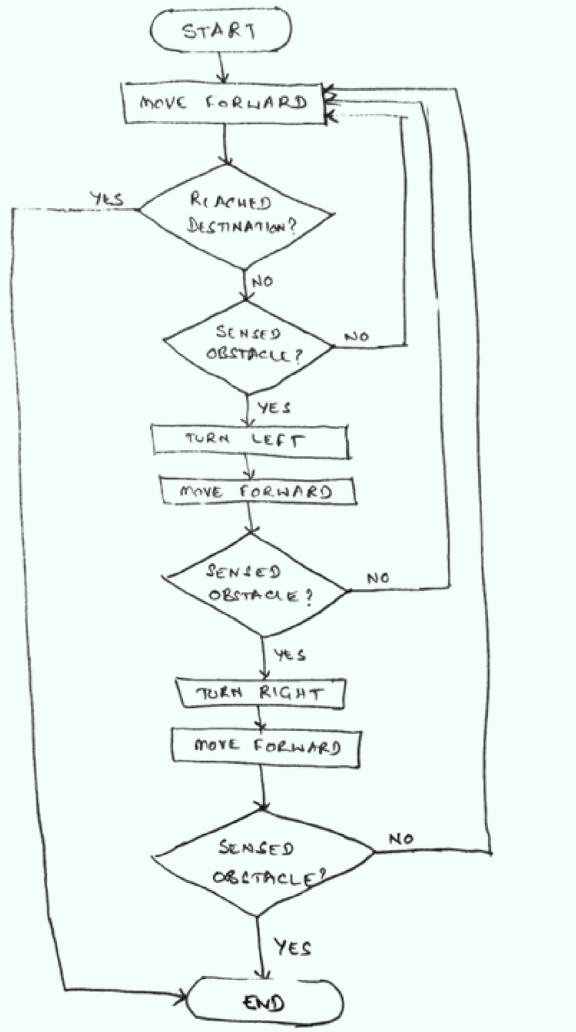


In the world of science and innovation projects, clarity of thought and process is essential for success. A **Flowchart** is a diagram that uses different shapes to represent steps, decisions, and inputs/outputs in a process. These shapes are connected by arrows indicating the direction of flow. A Flowchart shows how things work step-by-step. Instead of reading through long written instructions, a flowchart lets you see the whole process at a glance. It's a simple yet incredibly effective way to break down complex tasks into manageable, sequential steps.

Flowcharting technique offers students a powerful tool to visualize, organize, and communicate step by step procedures of implementing ideas. Mastering flowcharting techniques can be the difference between a confusing presentation and a compelling demonstration of innovative thinking. It helps identify mistakes before implementation ensuring nothing is overlooked. It makes sure that each step in a process is logically connected, which improves efficiency and accuracy.

Examples

- **Chemistry Experiment:** A flowchart can illustrate the sequence of steps for conducting a chemical reaction safely.
- **Environmental Project:** A flowchart can show the testing process for a biodegradable plastic.
- **Programming Project:** You can outline the logic used in programming a chatbot.
- **Biology Experiment**: You may use a flowchart testing plant growth under different light conditions. e.g., preparing the soil, planting seeds, setting up light sources, watering plants, and recording growth data.
- **Robotics Project**: You can use a flowchart to outline how a robot will detect an obstacle and change its path.



ROBOT PROJECT FLOWCHART
DETECTING AN OBSTACLE AND CHANGING PATH

- **Project Planning:** For an innovation project where you're designing a new app, a flowchart can help you organize the different stages like idea generation, wireframing, coding, testing, and final release. In a Team context, it can also help everyone understand who is responsible for each part of the project.
- **Creating a Website**: A flowchart could map out designing the layout, coding, testing, and launching the website.

- **Designing a Solar-Powered Fan:** A flowchart could map the steps of designing, building, and testing the fan, from research to final testing.
- **Water Purification Experiment:** A flowchart could represent the process of filtering water, testing its pH, and recording observations.
- **Smart Irrigation System:** You can flowchart the process of detecting soil moisture, activating a water pump, and stopping when moisture levels are sufficient.

How is it helpful?

Clear Visualization: Flowcharts give you a visual representation of your project's steps. Complex processes can be simplified when mapped out in a flowchart.

Helps with Planning and Organization: Before starting an experiment or project, students can create a flowchart to map out all the steps involved. This keeps the project on track and ensures all parts of the process are completed. Facilitates communication across teams.

Problem Solving: By visualizing the entire process, you can easily spot potential bottlenecks or areas where things might go wrong. This allows you to proactively address problems before they arise. Aids in troubleshooting and identifying inefficiencies.

Encourages Logical Thinking: Creating a flowchart forces students to think through the logic and order of their work, which strengthens their problem-solving skills.

Documentation: They serve as excellent documentation for your project, making it easier to replicate your experiment or build upon your work in the future.

What are different kinds of Flowcharts?

Process Flowchart: This type of flowchart, also called as Activity Flowchart, is great for projects where a system or method needs to be designed, such as creating a new product or a prototype.

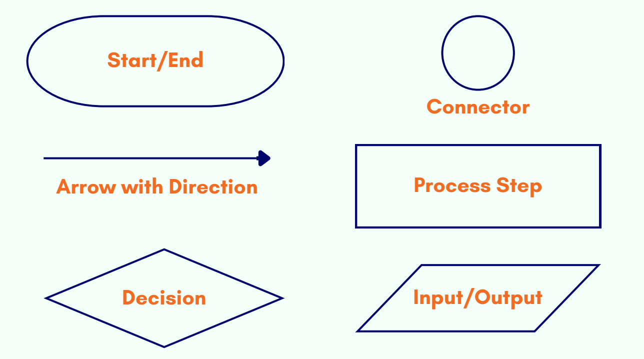
Decision Flowchart: If your project involves multiple decisions (e.g., testing different variables in an experiment), a decision flowchart helps visualize the different paths based on outcomes. e.g., whether to use solar panels or wind turbines in a renewable energy project based on cost and feasibility.

System Flowcharts: These represent how different parts of a system interact with each other. They are commonly used in robotics or electronics projects.

Experiment Flowchart: Used for outlining each step of an experiment. You may show how you will carry out the experiment from start to finish, including data collection and analysis. For example, choosing the best type of adhesive for constructing a model bridge by testing its strength and flexibility.

What Symbols are used in Flowcharting?

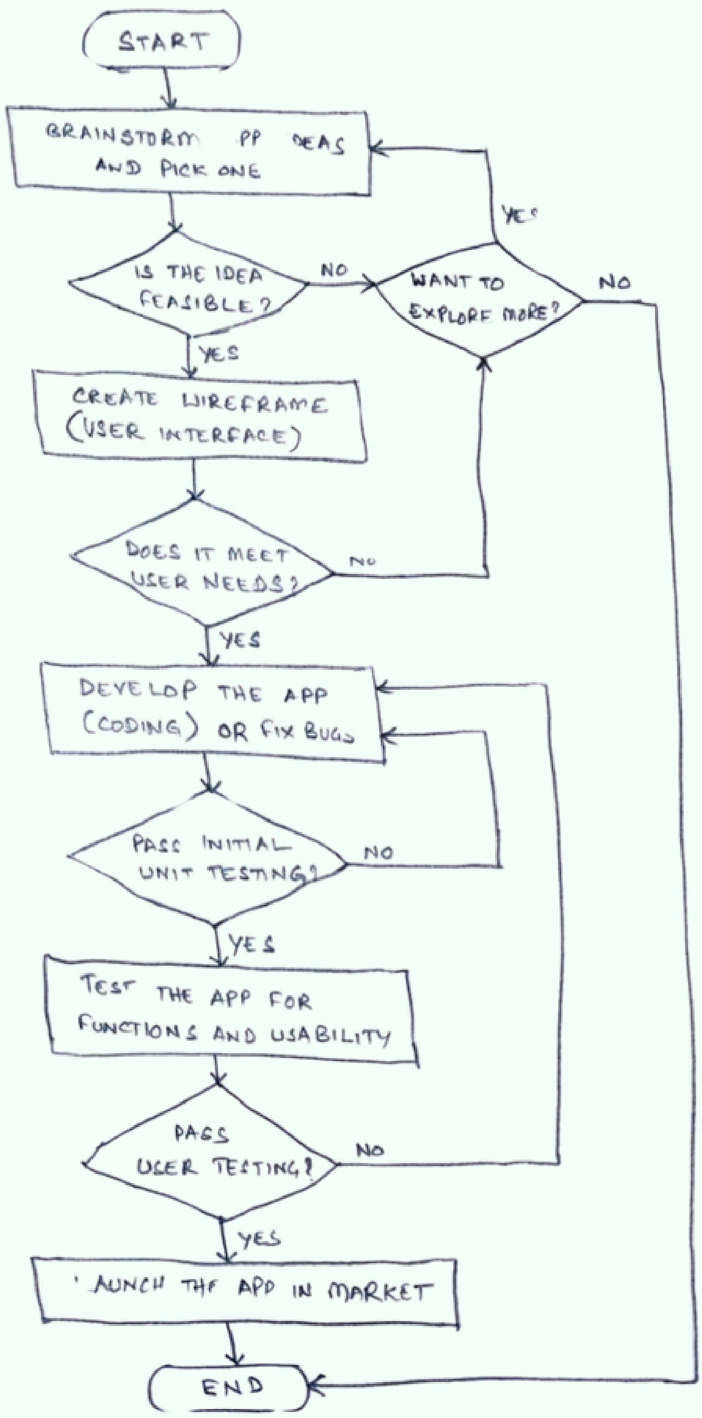
Flowcharting uses standardized symbols, each with specific meanings. Learning these symbols is the foundation of effective flowcharting techniques.



Flowchart Symbols

Oval = Start/End: Marks the beginning and end points of your process. Every flowchart begins and ends with an oval shape containing a word like Start, Begin, End, or Finish. Oval is also referred to as Terminator.

Rectangle = Process Step: The rectangle represents an action or operation that must be performed. e.g., Measure 10mL of Solution, Turn on the Motor, Record observations, etc.. Process boxes should contain clear, concise descriptions of single actions and must start with a verb.



NEW APP PRODUCT DESIGN FLOWCHART

Diamond = Decision: Perhaps the most powerful element in scientific flowcharts, the diamond represents a decision point where the process can take different paths based on a YES/NO question or condition. For example, "Is the solution blue?", "Temperature > 50°C?", "Does the robot detect an obstacle?". The diamond should always have two paths leading from it, typically labeled Yes and No. The phrase must end with a question mark inside the diamond.

Parallelogram = Input/Output: Used for input or output, such as collecting data or displaying results. e.g., "Enter temperature reading", "Display pH value".

Arrow = Flow Line: Arrow connects the symbols indicating the flow of the process. It shows the sequence of steps as well as the direction of flow. For example, arrows could show the flow from brainstorming ideas to sketching prototypes to testing them.

Circle = Connector: When flowcharts become large or complex, connectors are used to link different parts of the process, ensuring it's easy to follow. Connectors are small circles with numbers or letters.

For example, when a flowchart extends a page, a connector is placed at the end of the first page with a number, say 1, and another connector is placed at the beginning on the second page with the same number, i.e., 1.

How to Create Flowcharts?

The following step-by-step approach will help you develop clear, effective flowcharts.

Step 1 - Define Your Process Scope: Before drawing a single symbol, clearly identify what process you're mapping. Are you creating a flowchart for your entire experimental procedure, just the data collection phase, or perhaps the analysis methodology? Defining the scope helps determine the level of detail needed and prevents your flowchart from becoming unwieldy.

Step 2 - List All Steps and Sequence Them: On a separate sheet of paper, list all the steps involved in your process in chronological order, i.e., arrange them in the order they need to happen. Be thorough but concise—each step should represent a single action or decision. This helps you visualize the flow and see if there are any gaps or repeated steps.

In the example of a science experiment, this might include equipment setup, sample preparation, measurement, data recording, and analysis.

Step 3 - Identify Decision Points: Review your list and mark any points where the process might branch based on certain conditions or results. These will become your decision diamonds. For each decision point, clearly define the question being asked and the possible outcomes.

Step 4 - Draft Your Flowchart: Begin with a rough draft, placing the start oval at the top and working downward. Arrange process rectangles in sequence, inserting decision diamonds where appropriate.

Use arrows to connect the symbols, ensuring the flow direction is clear. For complex flowcharts, use connectors to avoid crossing lines.

Step 5 - Review and Refine: After completing your draft, review it critically and make necessary adjustments, simplifying overly complex sections and adding detail where needed. *Does it accurately represent your process? Are all decision outcomes accounted for? Is the flow logical and easy to follow? Have you used the correct symbols consistently?*

Step 6 - Create the Final Version: Once you're satisfied with your draft, create a clean, final version. Whether drawn by hand or using software like *Lucidchart, Canva, or draw.io*, ensure your flowchart is neat, properly labeled, and visually appealing. Use consistent sizing for symbols and straight lines for connections. Consider using color coding to highlight different phases of your process.

Tips for Creating Effective Flowcharts

- Keep it Simple: Don't overcrowd the flowchart with too many details.
- Use Standard Symbols: Stick to the traditional flowchart symbols to ensure others understand your chart easily.
- Be Clear with Labels: Make sure each step and decision is clearly labeled with concise descriptions.
- Test the Flowchart: Before starting your project, review your flowchart to ensure it covers everything. You can also ask a teacher or peer to look it over for suggestions.

Do you know?
Two Beautiful Training Modules are presented in each month's YSI Magazine.
Brainstorming and **5W's & 1H Techniques** were featured in *January 2025 Issue*. Do check.
You would love them.

Common Flowcharting Mistakes to Avoid

- **Ambiguous Decision Diamonds:** Every decision diamond must ask a clear yes/no question or present distinct conditions. Vague questions lead to confusion about which path to follow. Ensure each decision point has clearly labeled outcomes.
- **Missing Endpoints:** All process paths must eventually lead to an endpoint. Check that every branch in your flowchart reaches a conclusion and doesn't leave processes hanging unresolved.
- **Crossing Flow Lines**: Intersecting lines make flowcharts difficult to follow. Rearrange your symbols or use connector circles to avoid crossing lines whenever possible.
- **Overcomplicated Representations**: Sometimes students try to include too much in a single flowchart, creating an overwhelming diagram that's difficult to understand. Remember that clarity is the primary goal - if your flowchart becomes too complex, consider breaking it into multiple connected flowcharts.
- **Inconsistent Symbol Usage:** Using the wrong symbol for a particular step (like using a process rectangle for a decision point) undermines the standardized language of flowcharting. Review your flowchart to ensure consistent and correct symbol usage.

Let's Conclude...

Remember that the ultimate purpose of a flowchart is clarity—if your diagram helps others understand your process and helps you execute it more effectively, then you've created a successful flowchart. By using flowcharting technique, you can visualize projects more clearly, save time, and improve collaboration. With practice, flowcharting will help transform abstract ideas into concrete, actionable plans that lead to successful science and innovation projects.

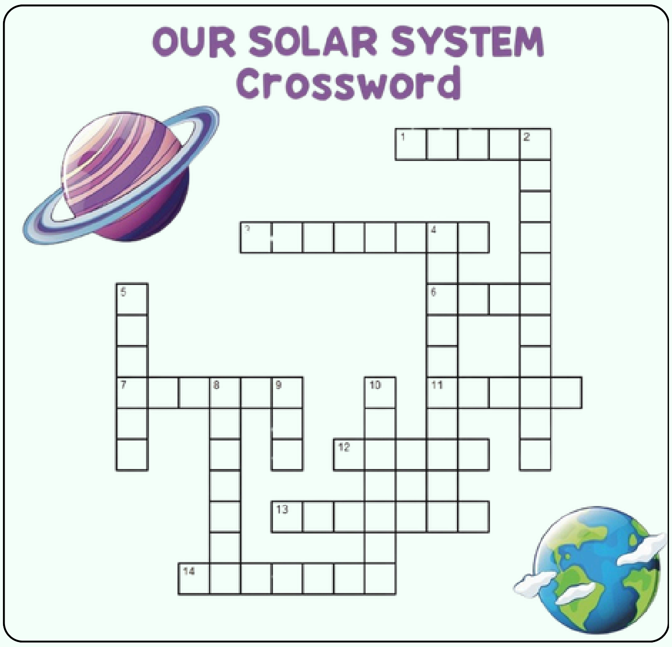
You may use flowcharting not just for science projects, but in any subject that requires clear planning and execution. Flowcharts are a simple yet effective tool to improve organization, reduce errors, and boost problem-solving skills. This ability to visually map processes and clearly communicate procedures will serve you well throughout your academic and professional career.

Science & Innovation News

Space Exploration: India's Successful Space Docking Experiment (SpaDeX): On December 30, 2024, ISRO launched the Space Docking Experiment (SpaDeX), successfully demonstrating in-space docking technology. This achievement positions India as the fourth country to master such technology, paving the way for future missions like Chandrayaan-4 and the Gaganyaan manned mission.

Science Celebrations: National Science Day 2025 in India: Observed on February 28, National Science Day commemorates the discovery of the Raman Effect by physicist C.V. Raman. The 2025 theme, "Empowering Indian Youth for Global Leadership in Science & Innovation for Viksit Bharat," emphasizes inspiring young innovators to lead India's future scientific endeavors.

Word Search 2502



ACROSS

1. Planet named after the Roman goddess of love and beauty
3. Our solar system is part of this galaxy
6. Nicknamed "the red planet"
7. Third largest planet in our solar system
11. Now called a dwarf planet
12. Covers 70 percent of the Earth's surface
13. Largest planet in our solar system
14. Planet closest to the sun

DOWN

2. A star and the planets orbiting around it
4. Layer of gas that surrounds a planet
5. Planet named after the roman god of agriculture
8. Planet furthest from the sun
9. Closest star to Earth
10. Force that keeps a planet moving in orbit

(Answers on Back Cover Inside)

Riddles 2502

1. You can't see me, but I can see you. To be more specific, I see through. What am I?

2 Give it food and it will live. Give it water and it will die. What is it?

3. What element is a girl's future best friend?

4. Many have heard it, but nobody has ever seen it. It will not speak back until spoken to. What is it?

5. What did the scientist say when he found 2 atoms of helium?

6. What is Black when you buy it, Red when you use it and Gray when you throw it away?

7. Which is heavier, a pound of bricks or a pound of feathers?

Sudoku Challenge 2502

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

Indian Scientist

Mr. Udbhab Bharali

Indian inventor

Born 7 April 1962

Uddhab Bharali is an Indian inventor known for more than 160 innovations, particularly in the fields of agriculture and assistive devices. Bharali's inventions aim to make life easier for people, especially those with disabilities, and farmers.

Early Life and Education

Bharali grew up in a business family in Assam and attended Government Higher Secondary School in North Lakhimpur. He pursued Mechanical Engineering at Jorhat Engineering College but had to leave his studies in 1988 due to financial difficulties.

Career and Innovations

- **Entrepreneurship:** Despite financial challenges, Bharali started a polythene cover-making business for tea estates in Assam. Instead of buying expensive machinery, he designed his own machine at a much lower cost, which sparked his passion for creating solutions through innovation.

Inventions: Bharali is best known for his agricultural automations.

- **Pomegranate Deseeder:** A machine to extract seeds from pomegranates, which earned him recognition in NASA's Exceptional Technology Achievement Medal competition in 2012.
- **Low-cost Peeler Machines:** Machines for peeling betel nut, cassava, garlic, jatropha, coconut, and Safed musli, all of which can be operated by a single person.
- **Bamboo Processing Machine:** A low-cost machine to process bamboo, a significant material in Assam.
- **Redesigned Assamese Paddy Grinder:** Improved traditional farming tools to enhance productivity.

Honors and Awards

He are a few Awards received by Mr. Uddhab.

- Padma Shri (2019), one of India's highest civilian awards.
- SRISTI Samman (2006), for grassroots innovation.
- National Grassroots Innovation Award (2009) from the National Innovation Foundation.
- Winner of NASA's Tech Briefs "Create the Future Design Contest" in 2012 and 2013 for inventions like a pomegranate deseeder and a detention chair for people with mental challenges.
- Honorary Doctorate from Assam Agricultural University (2014) and Kaziranga University (date unspecified).

Indian Invention

Plastic Surgery

Way before the world!

Origins of Plastic Surgery

Plastic surgery, which focuses on repairing, reconstructing, or altering the human body, has deep historical roots. Sushruta, an Indian physician from 600 BCE, is considered the "Father of Surgery."

He described plastic surgery techniques in his treatise, *Sushruta Samhita*. His contributions include performing complex procedures like brain surgeries, and nose reconstructions. He described various surgical techniques, including skin grafting, reconstructive surgery, and even cataract removal. He and his team conducted over 3,000 surgeries using more than 120 surgical tools.

The term "plastic" comes from the Greek word plastike, meaning "the art of reshaping." Treatments for reconstructing broken noses were first mentioned in Egyptian texts (c. 1600 B.C.). By 800 B.C., India had advanced techniques in reconstructive surgery, which influenced European surgeons.

One of his most significant contributions was the development of the forehead flap rhinoplasty, a technique used to reconstruct noses.

At the time, criminals and war prisoners often had their noses cut off as punishment. Sushruta devised a method to reconstruct the nose by using a flap of skin from the forehead, a procedure that is still used in modern plastic surgery, known as the "Indian Flap" technique.

Innovations in Ancient Indian Surgery

Sushruta's surgical techniques were advanced for his time and demonstrated a deep understanding of human anatomy. Some of the notable innovations in his medical practices included:

Rhinoplasty (Nose Reconstruction) – A method to rebuild the nose using skin grafts.

Otoplasty (Ear Reconstruction) – Techniques to repair damaged ears.

Skin Grafting – Transferring healthy skin to areas with wounds or burns.

Cataract Surgery – Early methods to remove cataracts and improve vision.

Wound Stitching – Use of natural materials like plant fibers and even ant heads to suture wounds.

Sushruta also emphasized the importance of hygiene, sterilization, and patient care, which are still fundamental in modern medicine.

Influence on Modern Plastic Surgery

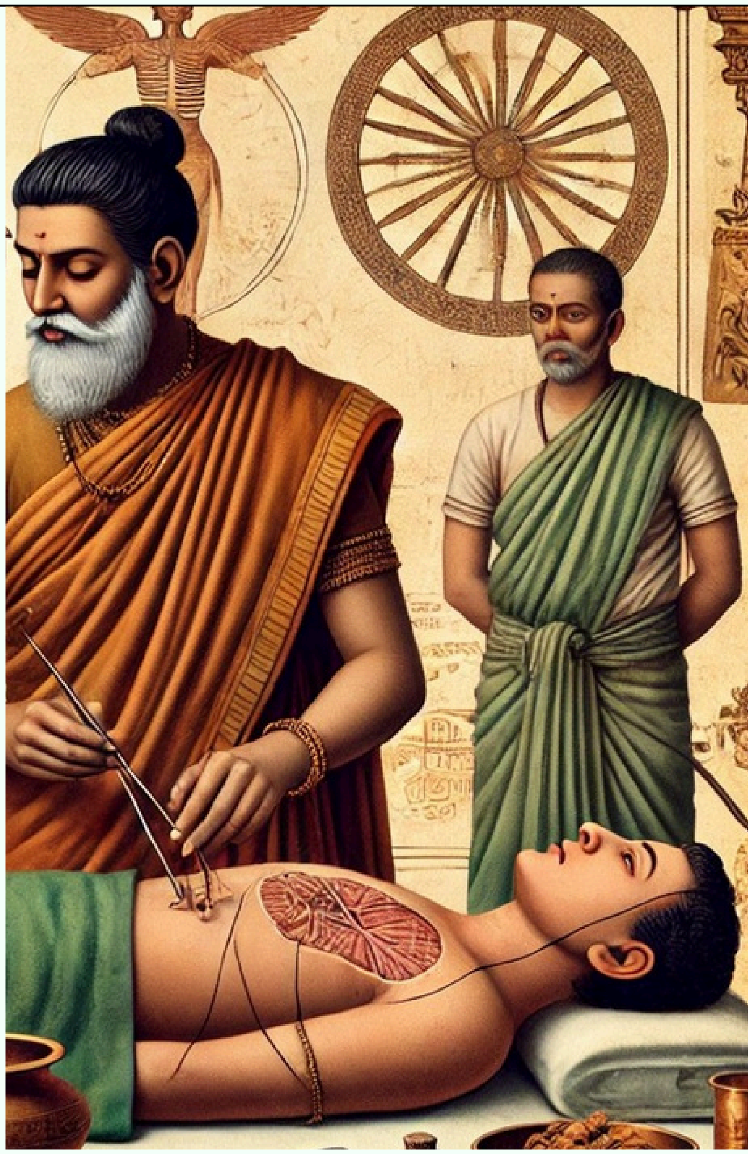
The knowledge from the Sushruta Samhita eventually spread beyond India. By the 18th century, British surgeons in India observed and documented the traditional Indian rhinoplasty technique. This information was later introduced to Europe, influencing the development of modern plastic surgery.

Today, plastic surgery is used for both cosmetic and reconstructive purposes, helping people recover from injuries, birth defects, and medical conditions. Procedures such as skin grafting, facial reconstruction, and microsurgery owe their roots to the pioneering work of Sushruta.

Impact on the World

The innovations of ancient Indian plastic surgery have had a profound and lasting effect on the world. Modern reconstructive surgeries have significantly improved the quality of life for burn victims, accident survivors, and individuals with congenital deformities. Advanced plastic surgery techniques have also revolutionized healthcare, allowing for life-saving procedures such as reconstructive surgeries for cancer survivors, and facial reconstruction for trauma patients.

Moreover, the cosmetic surgery industry, which generates billions of dollars annually, owes much to these early surgical techniques. The increasing accessibility of plastic surgery has helped boost self-confidence and mental well-being for many individuals worldwide. As technology continues to advance, the principles established by Sushruta still serve as the foundation for innovative surgical solutions today.



Conclusion

Plastic surgery is often seen as a Western advancement, but its origins lie in ancient India. Sushruta's groundbreaking techniques and deep medical knowledge have stood the test of time and continue to influence modern surgical practices.

Recognizing India's contribution to this field highlights the country's rich heritage in medical science and innovation. Through his work, Sushruta not only changed the face of medicine but also laid the foundation for future generations of surgeons and doctors around the world.

The Bihar Council on Science & Technology

The Bihar Council on Science & Technology (BCST) is an autonomous body established by the Government of Bihar with the objective of promoting science and technology in the state.

It serves as a platform for fostering scientific research, technological innovation, and science education, aiming to enhance the overall development of Bihar through the application of science and technology.

Key Functions and Objectives of BCST

- **Promotion of Scientific Research and Innovation:** BCST encourages and supports research in various fields of science and technology, including agriculture, environment, health, education, and industrial development. The council plays a key role in facilitating innovative projects that can have a practical impact on the state's socio-economic development.

- **Science Education and Awareness:** BCST works to raise awareness about the importance of science and technology through outreach programs. It promotes scientific education at various levels, particularly among students and young minds. The council organizes workshops, exhibitions, and science fairs to engage the public and cultivate a scientific temper.

- **Funding for Research and Development:** The council provides funding and financial support for research projects, especially those that focus on solving local challenges. BCST also assists educational institutions, universities, and research centers in conducting scientific research.

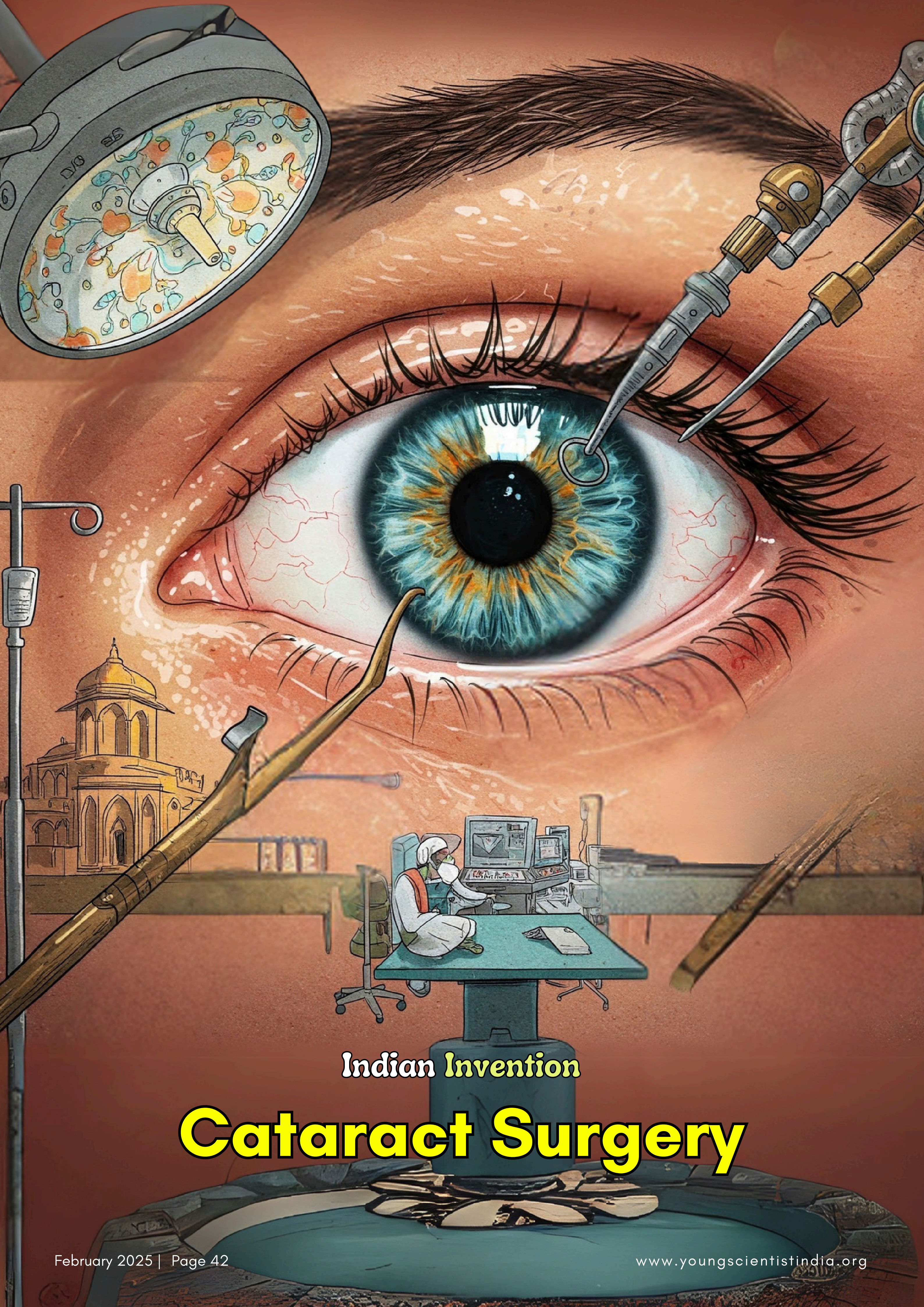
- **Sustainable Development and Environmental Protection:** The council is deeply involved in promoting sustainable development practices and environmental conservation through the use of technology.

- **Encouraging Entrepreneurship in Science & Technology:** The council encourages the establishment of technology-based startups and provides necessary support for entrepreneurs, particularly those focused on addressing local issues using innovative scientific solutions.

Key Programs and Initiatives of BCST

- **Science and Technology Popularization:** BCST organizes events like science festivals and seminars to engage students and the public in science and technology.

- **Statewide Science Competitions and Awards:** The council encourages young minds and students to take up science as a career through statewide science competitions. BCST also recognizes and rewards outstanding contributions in the fields of science and technology.



Indian Invention

Cataract Surgery

Historical Background

Cataract surgery dates back to ancient India, where **Sushruta**, often regarded as the **Father of Surgery**, pioneered this procedure around the 6th century BCE. His technique involved using a curved needle (Jabamukhi Salaka) to loosen and push the cloudy lens out of the field of vision.

Patients' eyes were then soaked in warm butter and bandaged for healing. Sushruta's work influenced medical practices globally, spreading to China, Greece, and eventually Europe through translations of the **Sushruta Samhita** into Arabic.

Purpose of Cataract Surgery

Cataract surgery is performed to restore vision impaired by cataracts, which occur when the natural lens of the eye becomes cloudy. Cataracts typically develop with age but can also result from injury, certain medications, or congenital factors.

Symptoms of Cataracts

- Faded colors
- Blurred or double vision
- Halos around lights
- Sensitivity to bright light glare
- Difficulty seeing at night

Procedure Overview

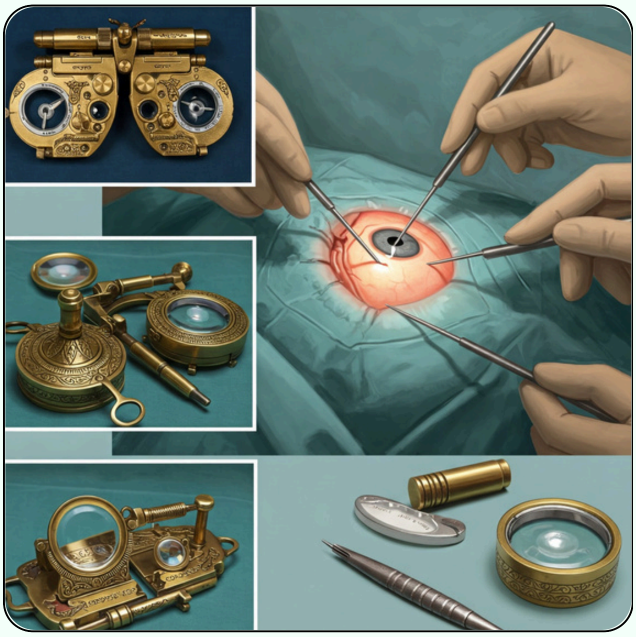
Cataract surgery involves removing the cloudy natural lens and replacing it with an artificial intraocular lens (IOL) to restore clear vision. The surgery is usually quick, performed under local anesthesia, and done on an outpatient basis.

Benefits of Cataract Surgery

- Improved vision and quality of life
- Greater independence in daily activities
- Reduced risk of falls or accidents

Types of Cataract Surgery

- **Phacoemulsification (Phaco):** The most common procedure in developed countries. An ultrasonic probe fragments the lens, which is removed by suction through a small incision. Foldable IOLs are typically inserted, and the small incision generally does not require stitches.
- **Manual Small Incision Cataract Surgery (MSICS):** Common in developing countries. The lens is manually extracted through a slightly larger incision, usually without stitches. MSICS is cost-effective and provides quick recovery with minimal complications.



- **Extracapsular Cataract Extraction (ECCE):** The lens is removed in one piece through a larger incision. This method may require stitches and is generally used as a backup in complicated cases.
- **Intracapsular Cataract Extraction (ICCE):** The entire lens and capsule are removed. This method has a higher complication rate and is rarely performed today.

- **Couching:** An ancient method involving dislodging the lens. It is no longer practiced in modern medicine.

Technological Advancements

- Femtosecond Laser-Assisted Phacoemulsification: Uses a laser for corneal incision, capsulotomy, and lens fragmentation, reducing the need for ultrasonic energy.
- Cryoextraction: A cryoprobe freezes and adheres to the lens, facilitating removal. This is occasionally used for dislocated lenses.

Types of Intraocular Lenses (IOLs)

- Monofocal IOLs: Provide clear vision at one distance (usually for distance vision).
- Multifocal IOLs: Offer both near and distance vision.
- Toric IOLs: Correct astigmatism.
- Accommodative IOLs: Shift position inside the eye to provide better focus at multiple distances.

Recovery and Aftercare

- Most patients experience improved vision within a few days.
- Full recovery takes about 4-6 weeks.
- Eye drops are prescribed to prevent infection and inflammation.
- Patients are advised to avoid strenuous activities during recovery.

Risks and Complications

While cataract surgery is generally safe, potential risks include:

- Infection
- Bleeding
- Retinal detachment
- Inflammation

These complications are rare, and the success rate of cataract surgery is over 90%.

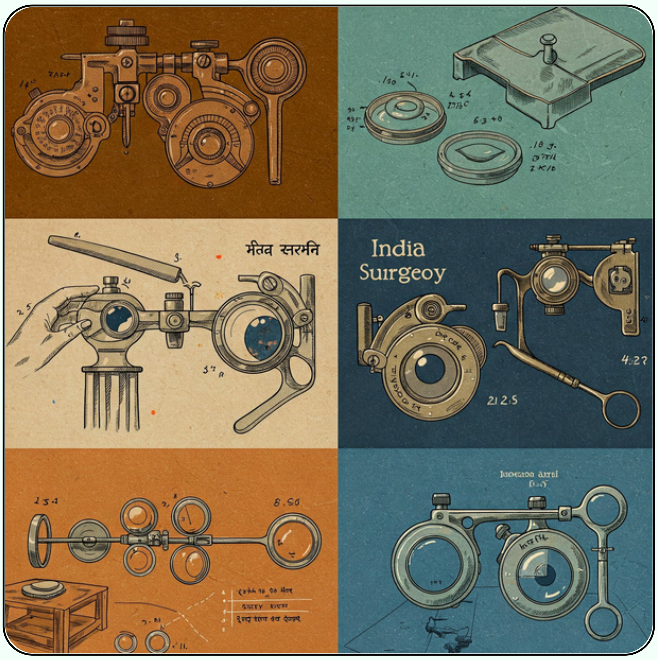
When to Consider Surgery

Cataract surgery is recommended when cataracts begin to interfere with daily activities like reading, driving, or watching television.

Global Perspective

Cataract surgery is one of the most frequently performed and successful surgeries worldwide. In the U.S. alone, over 3 million procedures are done annually.

The choice of surgical method often depends on the availability of resources, with phacoemulsification being more common in developed countries and MSICS preferred in developing regions due to its cost-effectiveness and high success rate.



Conclusion

Cataract surgery has evolved from ancient techniques to modern, minimally invasive procedures that restore vision for millions of people annually.

With a high success rate and quick recovery time, cataract surgery significantly improves patients' quality of life.

International Day of Women and Girls

February 11th – International Day of Women and Girls in Science. The International Day of Women and Girls in Science, observed on February 11th, is a global initiative to promote full and equal participation of women and girls in science, technology, engineering, and mathematics (STEM). Established by the United Nations General Assembly in 2015, this day highlights the critical role that women and girls play in scientific and technological advancements.

Medical & Biological Breakthroughs

February 28, 1953 – Discovery of DNA Structure: James Watson and Francis Crick announced their discovery of the double-helix structure of DNA, revolutionizing genetics.

February 3, 1966 – First Soft Landing on the Moon: The Soviet Luna 9 mission achieved the first successful soft landing on the Moon, sending back the first images of its surface

Physics & Engineering

February 11, 2016 – Gravitational Waves Confirmed: Scientists at LIGO announced the first direct detection of gravitational waves, confirming Einstein's theory from a century earlier.

February in Science History

February 12, 1809 – Birth of Charles Darwin: The father of evolutionary theory was born, leading to the development of the theory of natural selection.

Astronomy & Space Exploration

February 18, 1930 – Discovery of Pluto: Clyde Tombaugh discovered Pluto at the Lowell Observatory in Arizona, redefining our understanding of the solar system.

February 20, 1962 – First American to Orbit Earth: John Glenn became the first American to orbit Earth aboard Friendship 7 as part of NASA's Mercury-Atlas 6 mission.

February 14, 1990 – Pale Blue Dot Photograph: Voyager 1, from a distance of 3.7 billion miles, captured the iconic image of Earth as a tiny dot in the vastness of space.

February 6, 2018 – SpaceX Falcon Heavy Launch: The first successful launch of the Falcon Heavy rocket by SpaceX, carrying Elon Musk's Tesla Roadster into space.

Technology & Innovation

February 14, 1876 – Telephone Patent Filed: Alexander Graham Bell and Elisha Gray both filed patents for the telephone on the same day, leading to a famous legal battle.

February 4, 2004 – Launch of Facebook: Mark Zuckerberg and his team launched Facebook, transforming social media and digital communication

February 28th is National Science Day in India, which commemorates the discovery of the Raman Effect by Sir C.V. Raman in 1928

Central Building Research Institute

Located in Roorkee, Uttarakhand, India, the Central Building Research Institute (CBRI) is a premier research institution dedicated to advancing construction technology and creating a safer, more sustainable habitations. The focus is on building materials, technology, fire engineering and disaster mitigation.

A Legacy of Innovation: CBRI's journey began in 1947 with a focus on building materials and techniques. Over the decades, its scope has broadened to encompass architecture, urban planning, infrastructure development, and disaster mitigation. From time to time, CBRI publishes Building Research Notes on various Technologies, Materials, and Best Practices. CBRI boasts of over 120 Indian Patents and a couple of US Patents.

Core Research Areas: CBRI's research efforts are concentrated in several key areas:

- **Building Materials and Technologies:** Developing sustainable materials like lightweight composites for diverse building needs.
- **Structural Engineering and Safety:** Enhancing building resilience against natural disasters through advanced analysis and safety measures.
- **Sustainable Construction:** Promoting energy-efficient designs, renewable materials, and green building practices.
- **Disaster Mitigation and Management:** Developing strategies to minimize disaster impact on buildings and infrastructure.
- **Construction Automation Technologies:** Advancing technologies like prefabrication, modular construction, and 3D printing.

Key Functions and Contributions: CBRI plays a crucial role in:

- **Standardization and Guidelines:** Developing national construction standards and codes.
- **Consultancy and Advisory Services:** Providing technical expertise to government and industry stakeholders.
- **Training and Capacity Building:** Educating construction professionals through workshops and seminars.

State-of-the-Art Research Facilities: CBRI boasts advanced laboratories, including facilities for:

- **Earthquake Engineering:** Studying seismic performance.
- **Fire Safety and Hazard Testing:** Researching fire-resistant designs.
- **Energy-efficient Building Design:** Optimizing building energy consumption.

CBRI actively collaborates with Government Bodies influencing national policies and practices, Academic and Research Institutions advancing building technology through joint research, and Industry Stakeholders on commercializing new technologies.

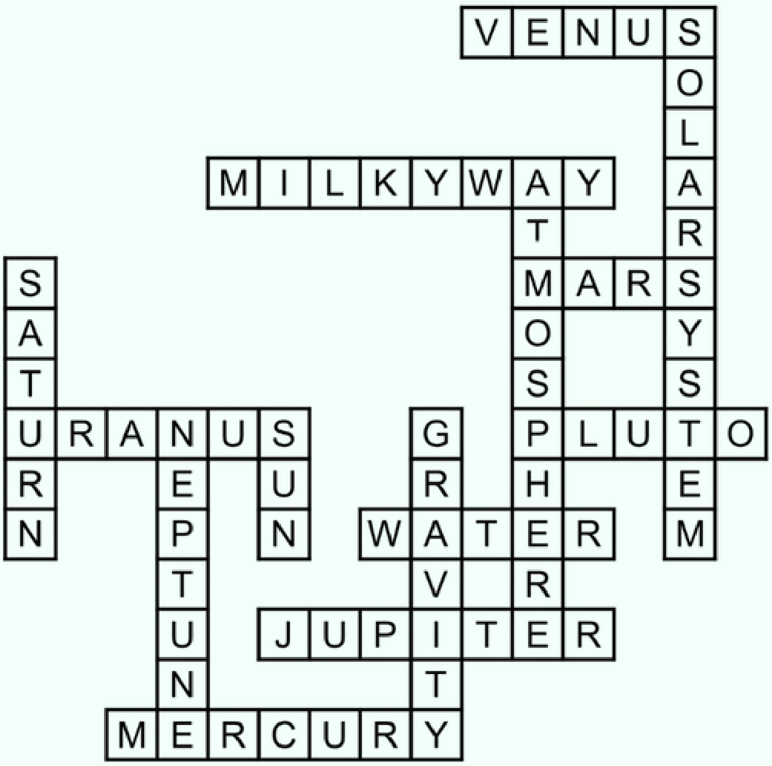
In conclusion, the CBRI, is a vital force in the construction industry, continuously innovating to create a safer, stronger, and more sustainable future for the the country.

Key for Brain Teasers

Sudoku Challenge 2502

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

Word Search 2502



Riddles 2502

1. An X-Ray
2. Fire
3. Carbon
4. An Echo
5. HeHe
6. Charcoal
7. They both weigh one Pound

National Kid Inventors Day
January 17

Benjamin Franklin was a child inventor himself. National Kid Inventors' Day is celebrated annually on January 17th to recognize the creativity and ingenuity of children as well as to honor Benjamin Franklin's birthday.

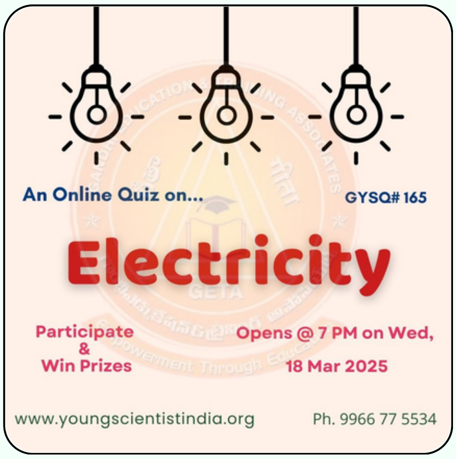
On this day, children are to think creatively and invent something or visit a museum. Schools and teachers may organize activities for students promoting innovation. For example, it could be an Elocution on Inventions, Innovations, and Scientists. May be a Drawing contest on Creative Ideas. There could be a Science Exhibition or Poster Presentations.

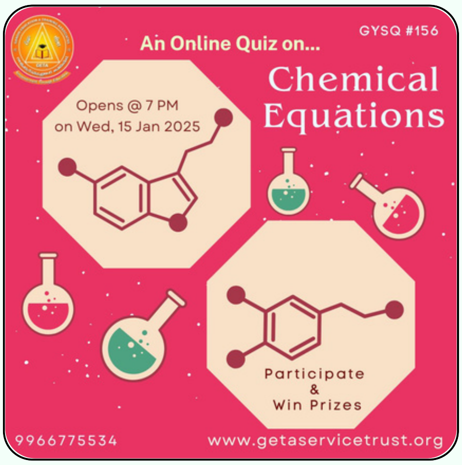
Do you know?

Renewable Energy Breakthroughs... Solar panels are becoming more efficient and affordable. Scientists are working on solar cells that can generate electricity from raindrops!

Young Scientist India

A Science & Innovation Magazine for School Students

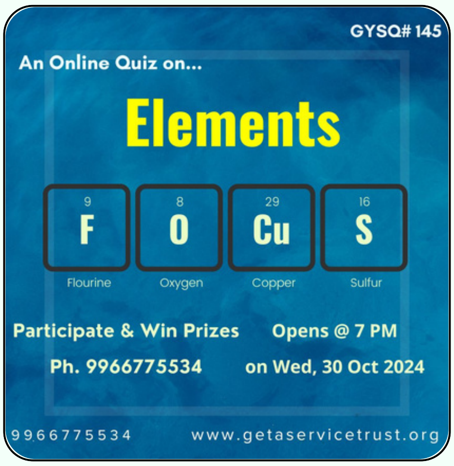




GYS WEDNESDAY SCIENCE QUIZ ONLINE

Building Science Temper towards Student Innovation

Every Wednesday At 7 PM.
For students from Classes 6 to 10.
25 Multiple Choice Questions.
20 Minutes.



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Get Quiz Answers and Score by email.
Score 60% and get a Digital Certificate.
Toppers in Class and get a Print Certificate.
Top two performers in each month get Cash Awards.