The

Assam Valley School

Science Journal

SPECTRUM

Vol 5

Issue 1

Editor's Note

"The science of today is the technology of tomorrow."--Edward Teller.

Welcome to another exciting issue of the Assam Valley School Science Journal! This time, we've got a fantastic lineup of articles that will ignite your curiosity and take you on a wild scientific ride. We're rocketing into the thrilling world of modern science. Modern science isn't just about cool facts and futuristic technology; it's about problem-solving, creativity, and making a positive impact. So, get ready to dive deep into the cutting-edge discoveries, groundbreaking technologies, and real-world applications that are shaping our future.

- Archana Yumnam

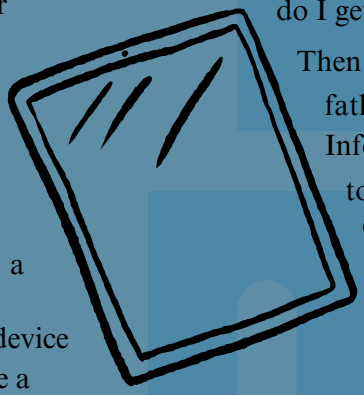
What's Inside

TRUTH

A SCIENCE FICTION SHORT STORY

By - Bariskhem K. Pohti, XII

The fumes clear and my vision too. I see it, the first rays of photons that struck my eyes. The room is dimly lit with a bluish hue. It is the day I was born. I vividly remember the first day at school. My parents took me to school in this vehicle that levitated way above the skyline of my city. It was hard to decipher the ground as it vanished beneath due to our high altitude. It was mesmerising to my eyes, to witness the fact that the buildings too hovered way above the ground like our vehicle. I was told by my parents how the past had the concept of roads which was a very cumbersome way of transportation. The problem of traffic jams and delays was the most difficult task of the previous generations. They never reached their destinations on time.



My school days were quite mundane and effortless, as I had to put in little to no effort into assimilating the knowledge taught by my teachers. The system of attendance and maintaining records was also a very easy task. All we had to do was to walk through the doors and a very intricate device placed along the frame of the door would take a scan of us with these weird beams of light that felt ticklish to the touch.

This was most of my school life. Mundane and monotonous, filled with classes and auto-assimilation of information. The medium of recording information in our school would be a simple six-inch sized tablet where all we had to do was press two buttons that were termed as “Record” and “Assimilate”. This mundane cycle continued for twelve years of my life. I would return home from school by performing a simple task and it was the task of pressing another button on my tablet, a tablet known as the Assimilator. The Assimilator would send a signal to my family’s Flyavan, a vehicle which aided us for our travels, my parents described it as a vehicle that could be compared to our ancestor’s Cars. Mechanical machines that ran on oil and emitted toxic fumes poisonous to our species. A strange feeling enveloped me during the time I went to school, a sudden flash of sights and sounds shrouded me.

I could see what my parents used to describe as the ancient world. Sounds of mechanical cars. Sight of massive factories that emitted toxic and poisonous gases. Pathways made of charcoal and tar. As I grew up, these visions compounded and grew and grew, never seeing a chance of tapering or stopping. I questioned and enquired my parents about this and to which I always got the answer that it would disappear by itself and I needed to give it time and patience.

Time passed quickly and it had been a cycle of five years. Always receiving the same answer to my questions, it accelerated my frustration towards not receiving answers. Answers to my condition. Why do I get this? Am I abnormal? Am I human?

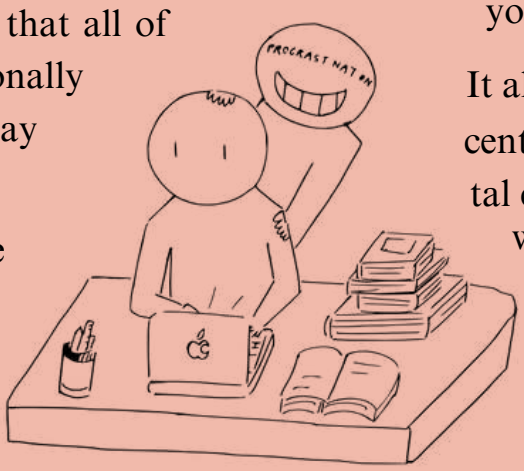
Then one day, as I peered down the drawer of my father’s study, I saw a piece of paper. Information that was enough to terrify me down to my core, rock my heart, my spine shivered, except the fact I did not possess either of the two. It all came together, and everything was answered.

Science behind Procrastination

By - Khushi Todi, X

Do you often find yourself procrastinating?

Well, that is what I did when I was told to write this article. In simple terms, procrastination is when we delay or postpone the tasks we should be doing. This could mean delaying assignments or waiting until the last minute to study for an exam. It is something that all of us intentionally, or unintentionally end up doing in our day-to-day lives. One common reason is that we tend to underestimate our albitites and potential. There is a constant fear of being judged for which we avoid completing the task. Procrastination not only makes us lazy, but it also hinders our progress on a professional and emotional level.



While procrastination is often attributed to laziness or a lack of self-motivation, many underlying factors contribute to it. As our bodies and minds work. There are scientific reason behind why we procrastinate.

The limbic system also known as the paleomammalian brain is one of the most dominant portions of the brain and works automatically. It is a complex network of structures in the brain, which includes the hippocampus responsible for memory, and the hypothalamus responsible for regulating body temperature, hunger, sleep, and many other vital functions. One of its primary functions is to prevent you from doing unpleasant things, such as touching a hot surface, by triggering an immediate response to avoid such actions. It also tries to prevent you from doing things you don't want to do, like studying.

It also acts as our emotional control centre while connecting to the prefrontal cortex. The prefrontal cortex is a weaker section of the brain where planning complex behaviors, expressing, and decision-making occurs. It's in charge of the thoughts and actions you take to reach a goal, the limbic system reach a goal, The limbic system being much stronger wins against the weaker prefrontal cortex leading to procrastination. It often results in a battle between your present self and your future self. Whenever you're not consciously working on something, your brain's pleasure center (limbic system) takes the wheel, leaving you to indulge in whatever feels good at the moment. Unfortunately, that usually means putting off those not-so-fun tasks like completing that assignment of yours.

It's like your brain is saying "Why complete your assignment when you can watch cat videos instead?". In this case, you're being rewarded for not doing the task that you're supposed to because it feels better for your brain.

It is possible to reduce procrastination by training your brain, regardless of your tendency to procrastinate. It can happen by taking small steps every day such as the ones mentioned below:

- Make short-term goals and achieve them
- Set a timer and get up only after being done with the task
- Reward system- reward yourself after completing your tasks; It can be anything simple in our day-to-day lives
- Do the worst or the most challenging task first
- Create a workspace free from distractions (physical or digital)

Reference- https://nesslabs.com/neuroscience-of-procrastination

A Cosmic Mystery

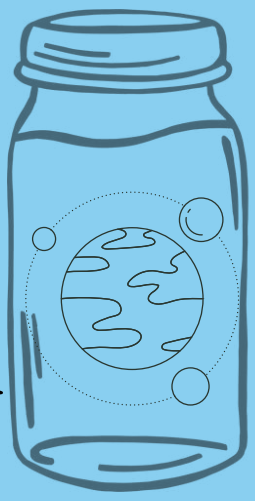
By - Vidhi Chopra, X

In the heart of the cosmos,
Where mysteries and shadows reside
The black hole lies
A mystery so fast, yet to unfold

A happening star,
That once burned fiery bright
Had collapsed on itself
On a fateful night

A fall so deep, so dark
Into the point of no return
Where light is swallowed inside
Journey deterred, whispers and
unheard words

Laws of physics left bent
By a singularity's enigma
Secrets unbound, a puzzle of the mind
The black hole's dark embrace, a wonder we may find



Aeromodelling - Aero-Sports

By - A.S. Huidrom, Physics Department

Aeromodelling, an engaging activity that entails designing, constructing, and flying model aircraft, employs a variety of materials such as paper, plastic, or wood. The purpose of this activity is to spark curiosity and educate students about the history of aviation, including the Wright brothers' invention of the airplane. Its primary goal is to instill in young minds a sense of curiosity about science and technology, as well as provide a brief overview of aviation history, particularly the Wright brothers' invention of the airplane.

During the Founders' Days celebration in 2023, eager students took an active part in this activity, honing their skills in flying remote-controlled airplanes and building confidence, which is essential for their potential future as astronauts or pilots. The pioneers of aeromodelling, including Dr. Thomas Young, John String Fellow, Sir George Caley, and Alphones Penand, made significant contributions by building various models powered by engines or steam and inventing models fitted with tail surfaces and wings with dihedral angles, which provide substantial stability of flight to aero models.

In 1878, Professor Langley developed a petrol-driven model called 'Aerodrome No.5', a revolutionary invention that significantly advanced the concept of aeromodelling by providing enthusiasts with an ideal power plant small enough for their requirements. Finally, on December 17, 1903, the Wright brothers accomplished the first powered flight, covering a distance of 120 feet at a speed of 6.8 mph over the ground.

It is an excellent way to educate students about aviation history, build confidence, and prepare them for future careers in this field. The history of aeromodelling is full of fascinating stories that continue to inspire and spark curiosity in the world of aeromodelling today.

In conclusion, aeromodelling is a fascinating and informative activity that inspires and motivates individuals to pursue further advancements in science and technology.

With its rich history, it provides a unique opportunity to learn about aviation and the pioneers who made significant contributions to its development. It is an excellent activity for building confidence and preparing individuals for future careers in this field.

Reference- https://en.wikipedia.org/wiki/History_of_aviation

Everyday Science_ Sustainable Practices: A DIY Approach

By - Dr. Alpana Dey

The relentless depletion of trees for paper production, coupled with the staggering amount of paper waste ending up in landfills annually, poses a significant threat to environmental sustainability. The ensuing emission of greenhouse gases, particularly methane, exacerbates global warming. Amidst mounting concerns about climate change.

Individuals are often confused about their role in mitigating environmental degradation. While governmental and non-governmental organizations play pivotal roles, individual contributions are equally indispensable. In our everyday science activity, we practice recycling methodologies to curb waste and greenhouse gas emissions.

These initiatives encompass recycling waste paper, composting green kitchen waste, and formulating eco-friendly cleaning solutions such as white phenyl infused with neem extract. By disseminating accessible do-it-yourself (DIY) strategies, we empower citizens to participate in waste reduction endeavours actively. These cost-effective and meticulously tested methods alleviate paper waste and signify a grassroots effort towards environmental stewardship.

Encouraging readers to engage with these DIY practices underscores our collective responsibility to foster a sustainable future.

Reference - https://8billiontrees.com/trees/how-many-trees-are-cut-down-each-year-for-paper/# -

A Look At Paper Making

A DIY Experience

By - Archana Yumnam, XII

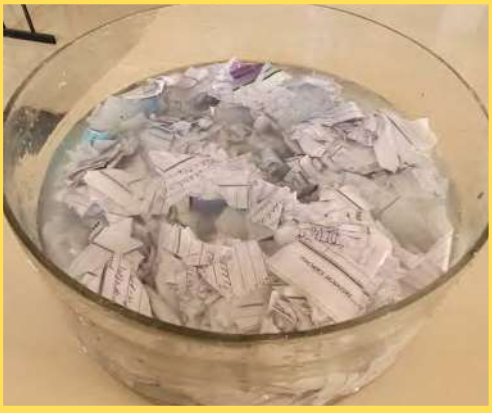
The story of papermaking traditionally begins in China around 105 AD, credited to Cai Lun, a court official. He created paper using plant fibres like mulberry and hemp, forming a thin sheet on a screen. This technique, with regional variations, spread throughout Asia and eventually reached Europe in the 8th century.

At its heart, papermaking involves transforming plant fibres into a watery pulp. Traditionally, these fibres came from sources like rags, bamboo, or tree bark. Today, wood pulp, primarily from softwood trees, is the dominant material. The pulp is broken down in water and then spread onto a fine mesh screen, allowing the water to drain and the fibres to interlock.

Handmade papermaking, still practised as a craft and art form, mirrors these steps on a smaller scale. A mould and deckle (removable frame) are used to capture the pulp on a screen, and the sheet is then carefully pressed and dried.

Process making of handmade paper using waste paper at home:

- Shred the Paper: Tear or cut the waste paper into small pieces.



Shredded Paper

Paper Pulp

- Soak it Up: Place the shredded paper in a large container and cover it with water. Let it soak for at least 4-6 hours, or even overnight. The paper should become soft and mushy.
- Blend it Smooth: Drain most of the water and transfer the soaked paper to a blender. Add some fresh water to create a soupy mixture. Blend it for 30-40 seconds until you have a smooth pulp with no large paper flakes.

- Catch the Paper: Prepare a shallow basin or tub filled with clean water, also a mould and a deckle (a frame with a mesh screen).
- Forming the Sheet: Dip the mould and deckle into the pulp mixture, gently swirling it to capture a thin layer of fibres on the screen. Lift it slowly and let the water drain back into the tub.

Paper Pulp in Mesh

Recycled Paper

- Press and Dry: Carefully flip the mould onto a flat, absorbent surface (like a towel) and remove the deckle. Press out any excess water with another absorbent surface. Leave the paper creation to dry completely, which can take a day or two.

Bookmarks

Diary

Cards

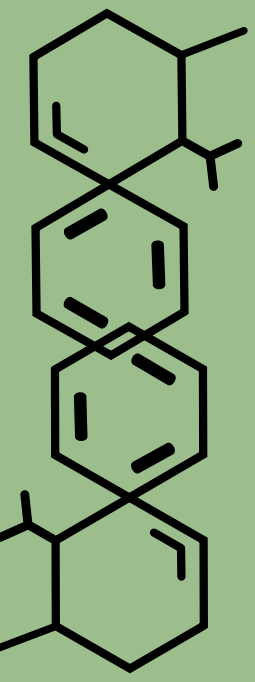
A few products made using the recycled paper

Reference -https://en.wikipedia.org/wiki/History_of_paper
https://www.britannica.com/technology/paper

White Phenyl Making

A HANDS ON DIY EXPERIENCE

By - Prayaash Khakolia, X



INTRODUCTION:

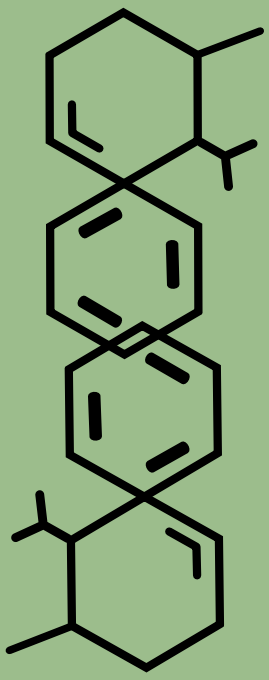
White phenyl, derived from pine oil, stands as a versatile disinfectant widely used for its cleaning efficacy, odour removal, and bacteria-killing properties. Its preparation, though seemingly simple, offers an array of advantages beyond just cleanliness. By delving into the process of crafting white phenyl at home, individuals unlock a realm of benefits ranging from cost-effectiveness to environmental consciousness.

In this article, we explore the compelling reasons why individuals are increasingly opting to create white phenyl in the comfort of their homes. From cost-effectiveness and customization to safety and environmental considerations, the benefits of homemade white phenyl are boundless. Join us as we delve into the myriad advantages that making white phenyl at home brings to both households and the planet.

PROCEDURE:

White phenyl is a disinfecting agent derived from pine oil. It is commonly used for cleaning, removing odours, and killing bacteria. Making white phenyl is a pretty straightforward process. We require mainly two ingredients: pine oil and emulsifier.

1. To make white phenyl we need to make white phenyl concentrate first. We start by taking 40 millilitres of emulsifier and adding 160 millilitres of pine oil to it. Now we stir the solution till it clears. We have successfully made white phenyl concentrate.
2. To turn the white phenyl concentrate into white phenyl, we need to dilute it with water. We add 800 millilitres of water to the concentrate and stir the solution till it is free of lumps. This gives us one litre of white phenyl.



WHY MAKE WHITE PHENYL AT HOME?

Cost-Effective: White phenyl can be more affordable when made at home compared to purchasing it from stores. Creating your own saves you money on packaging, branding, and distribution costs. The average one-litre bottle of white phenyl costs about 85 rupees in india. When we make white phenyl at home, a litre costs about 22 rupees.

Emulsifier price (1L) = Rs. 150
Pine oil price (1L) = Rs. 500

Cost of 1L of our white phenyl:
1/100 * 150 + 4/100 * 500
= 1.5 + 20
= Rs. 21.5
= Rs. 22

Freshly prepared White Phenyl

MORE BENEFITS OF MAKING WHITE PHENYL AT HOME:

- **Customization:** When you make white phenyl yourself, you have control over the ingredients. You can choose high-quality pine oil and emulsifiers, ensuring a better end product.

- **Safety and Transparency**: Homemade white phenyl allows you to know exactly what goes into it. You can avoid harmful chemicals or additives that might be present in commercial versions. Transparency about ingredients is crucial for safety, especially if you have allergies or sensitivities.

- **Freshness and Potency**: Homemade white phenyl is fresh and hasn't been sitting on store shelves for extended periods. Freshness ensures maximum potency and effectiveness.

- **Eco-Friendly**: Making your cleaning products reduces the need for excessive packaging and plastic bottles. It's a greener choice for the environment.

- **Immediate Availability**: When you run out of white phenyl, you can quickly whip up a new batch at home. No need to rush to the store or wait for delivery.

- **Learning Experience**: DIY projects like making white phenyl provide a learning opportunity. You gain knowledge about chemistry, emulsification, and cleaning agents

Reference - https://www.wikihow.com/Formulate-White-Phenyle

Building with paper: The rise of Papercrete.

A DIY EXPERIENCE

By - Archana Yumnam, XII

Papercrete is an innovative building material gaining traction in the eco-conscious construction industry. This composite material combines recycled paper with Portland cement or clay, offering a unique blend of benefits and consideration. By using waste paper, it reduces the amount of cement use making it a environment friendly building material. Papercrete motivates recycling of paper especially in communities with no recycling services.

Papercrete gets its name from the fact that most formulas use a mixture of paper and cement with cellulose fibre.

The ingredients are as follows:

1. waste paper
2. all purpose flour (maida)
3. a little bit of glue (optional)
4. POP/cement

First we soak the waste paper in water for 1 day and grind it into a pulp. Then, we mix the pulp with maida, pop in the ratio of 3:1:1 Then we mould it into different shapes of our choice.

At its core, papercrete diverts waste from landfills. By incorporating shredded paper pulp, it reduces reliance on traditional aggregates like sand and gravel. This not only lessens environmental impact but can also be a cost-effective option. Additionally, papercrete boasts excellent thermal and sound insulation properties, making it ideal for energy-efficient buildings.

It is low-cost, lightweight, and environmentally friendly. Additionally, it has a big variety of shapes, colours, and textures, making it versatile for facade cladding systems.

However, there are also some disadvantages to using papercrete. The mechanical properties of papercrete, such as compressive strength, splitting tensile strength, and flexural strength, decrease with an increase in the percentage of paper used . The lack of official data about its structural behaviour, mechanical properties, and durability limits its use and standardisation .

Further experimentation and research are needed to overcome these limitations and fully utilize the potential of papercrete as a building material .Management is another key consideration. Papercrete, like any Moisture cellulose-based material, can be susceptible to mold growth if not properly protected. Waterproofing measures become essential, particularly in areas with high humidity.

Despite these considerations, papercrete holds promise for sustainable construction. It offers a unique opportunity to reduce reliance on virgin resources and create well-insulated, comfortable living spaces. With careful planning and execution, papercrete can be a viable option for those seeking an eco-friendly and innovative building experience.

Reference - https://www.buildwithrise.com/stories/what_is_papercrete

Plant Pots made of Papercrete

A tool stand made of Papercrete

By - Vidhi Bajaj, X

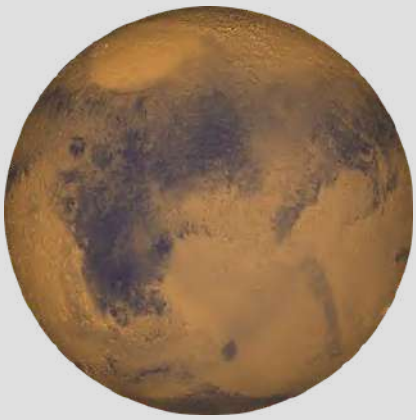
Was There Life On Mars

Human Beings find it fantastic to find out if there are others like them living on different planets or maybe galaxies. It is fanciful to imagine life on Mars. The developed technologies are an aid for searching for life beyond Earth. Mars being a rocky planet finding extraterrestrial life was a central aspect of the research. Jazero crater was selected as the Mars landing site, it predicted that there was a lake on Mars and back then Mars was warm and wet. As we all know water is essential for one's survival and Sedimentary rocks that form from aqueous ventures can be excellent preservers for biological materials. Perseverance has also given us clues about Igneous materials that were there on Mars and these materials can also be helpful for the survival of life on Mars.

Several Missions were launched throughout the world to study life on Mars. This Mission also includes Mission Mangalyaan which was launched by India, making India first to reach the Martian Orbit in its first attempt. The Mission was launched by the Indian Space Research Organisation to study the red planet and to explore the inner solar system. The mission saw several movies and TV shows in India. Mission Mangalyaan was released. Writer Minnie Vaid wrote a book called "Those Magnifying Women and Their Flying Machine," which profiles the journey of some of the key women who had leading roles in the mission.

The Exomars Mission which was launched by the European Space Agency in Russia, comprises two missions which are- The Trace Gas orbiter which was launched in 2016 and the second Rosalind Franklin Rover which will launch in 2028. A key goal of the ExoMars Trace Gas Orbiter, a joint mission of the European Space Agency and Russia's Roscosmos, is to gain a better understanding of methane and other atmospheric gases that are present in small concentrations in the Martian atmosphere. According to European Space, energy these gases could cause the biological and geological conditions that favoured the survival of livelihood on Mars.

Though several missions took place on Mars, the result does not state that there was life on Mars. Mars remains our horizon goal for human exploration because it is one of the only other places we know where life may have existed in the solar system. What we learn about the Red Planet will tell us more about our Earth's past and future, and may help answer whether life exists beyond our home planet. Like the Moon, Mars is a rich destination for scientific discovery, a driver of technologies that will enable humans to travel and explore far from Earth.



Reference- https://mars.nasa.gov/

Mere exposure effect and music

By - Raisah Yesmin Hazarika, X

The mere exposure effect may sound boring at first but it's quite interesting, the name itself suggests what it is, the effect of mere exposure to anything, we tend to prefer things we have been exposed to before, it is the effect of repeated exposure that we get. Music, for example, songs that have repeated choruses are the songs we tend to enjoy more. Critics frown upon musical repetition though we have come to know that musical repetitions are the key feature of experience we consider musical.

It's funny how when people were asked to listen to musical compositions that avoided repetitions and versions of the songs that have been DIGITALLY altered, they rated the altered one more enjoyable and MORE LIKELY TO BE COMPOSED BY A HUMAN ARTIST, and the most interesting part of repetition of music is that it often has an effect of earworms; earworms are not worms in the ear, they are a catchy or memorable piece of music or saying that continuously occupies a person's mind even after it is no longer being played, songs that keep replaying in a loop in our minds, especially when there are 5 minutes on the clock and you are trying to remember the answer to the last question in the examination hall, earworms burrow in when we are doing work that requires less attention, earworms are auditory imagery and are caused by the repetition of songs (mere exposure effect) or songs we had just listened recently.

Why are songs the most common earworm?

When we are listening to songs we are constantly anticipating the next note.
A tune is sort of like a habit. Once a tune is suggested, we have to play it till it reaches a natural stopping point. If I want to know the tune of a birthday song I would have to sing the whole sentence through, why is our brain so susceptible to music? Scientists have not yet figured it out but I have my theory, you may have heard of the memory curve, it is like a graph where when we read something it is on the top of the graph but if it is not revised, the line starts to recede downwards till we forget completely when we hear a song repeatedly it is like were revising the song hence staying in our memory till it is the only thing we think about, and that's earworms and the mere exposure effect and there so much more to discover about this as well but that's all from my side.

Reference - https://www.wired.com/story/why-songs-get-stuck-in-your-head-how-to-stop-them/#:~:text=Studies%2C%20like%20this%20one%20published,recency%2C%20familiarity%2C%20and%20boredom,
https://www.youtube.com/watch?v=3NE_OoO-N54,
https://www.youtube.com/watch?v=1lo8EomDrwA+

Inscignis 2024

ANNUAL SCIENCE FAIR AT TEZPUR UNIVERSITY
ON THE OCCASION NATIONAL SCIENCE DAY

Tezpur University organized the annual science fair INSCINIS on 28th and 29th of February, 2024. It is one of the leading and the biggest science festivals in North-East India, celebrated every year on the occasion of National Science Day, commemorating the contributions of the first Nobel Laureate in Physics for India, Sir C.V. Raman.

Along with many other educational institutes our school also took part in many of the events that were organized under this event and our students have excelled and have achieved many positions under different events.

The following were the events at the science fair:

- **BLITZ**
- **Einstein's Enigma**
- **Chess-e-matics**
- **Equipulaten**
- **What If**
- **NERLSE (North Eastern Regional Level Science Exhibition)**
- **Lights Camera Action**

Many of our students have bagged awards at this science fair and brought laurels for the school:

- **BLITZ** - Saanchit Agarwal & Krishang Choudhary - 1st Position

- **Einstein's Enigma -** Archit Phukan, Kelden Rigsang & Prayaash Khakolia (1st Position)

- **Chess-e-matics -** Kelden Rigsang (1st position) & Pahal Bajaj (2nd position)

- **Equipulaten -** Ashmit Phukan (2nd Position)

- **Astronomy Board Game -** Karan Somani, Archit Phukan & Badapbiang Kshiar (2nd Position) & Aalmas Maibam and Akshat Poddar (3rd Position)

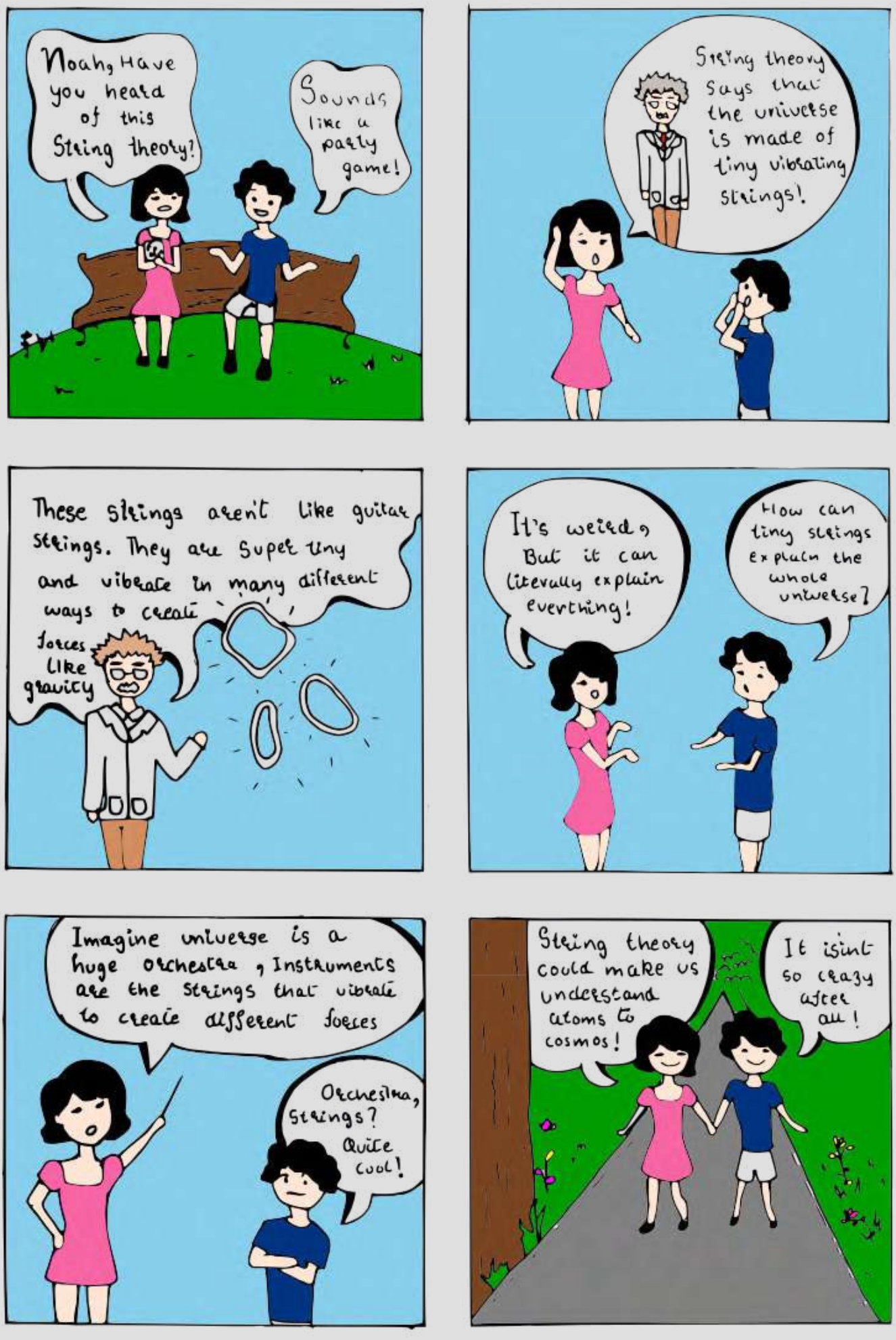
- **What If** - Karan Somani and Archit Phukan (1st Position) & Badapbiang Kshiar and Vidhan Fogla (3rd Position)

- **NERLSE -** Archana Yumnam and Misna Sarangthem (Consolation Prize at School level)

- **Lights Camera Action** - Pradyumn Bhajanka, Abhinav Agarwal & Manas Keleng (2nd Position)

Tangled In Strings

By - Vidhi Bajaj and Sneha Ngangom, X



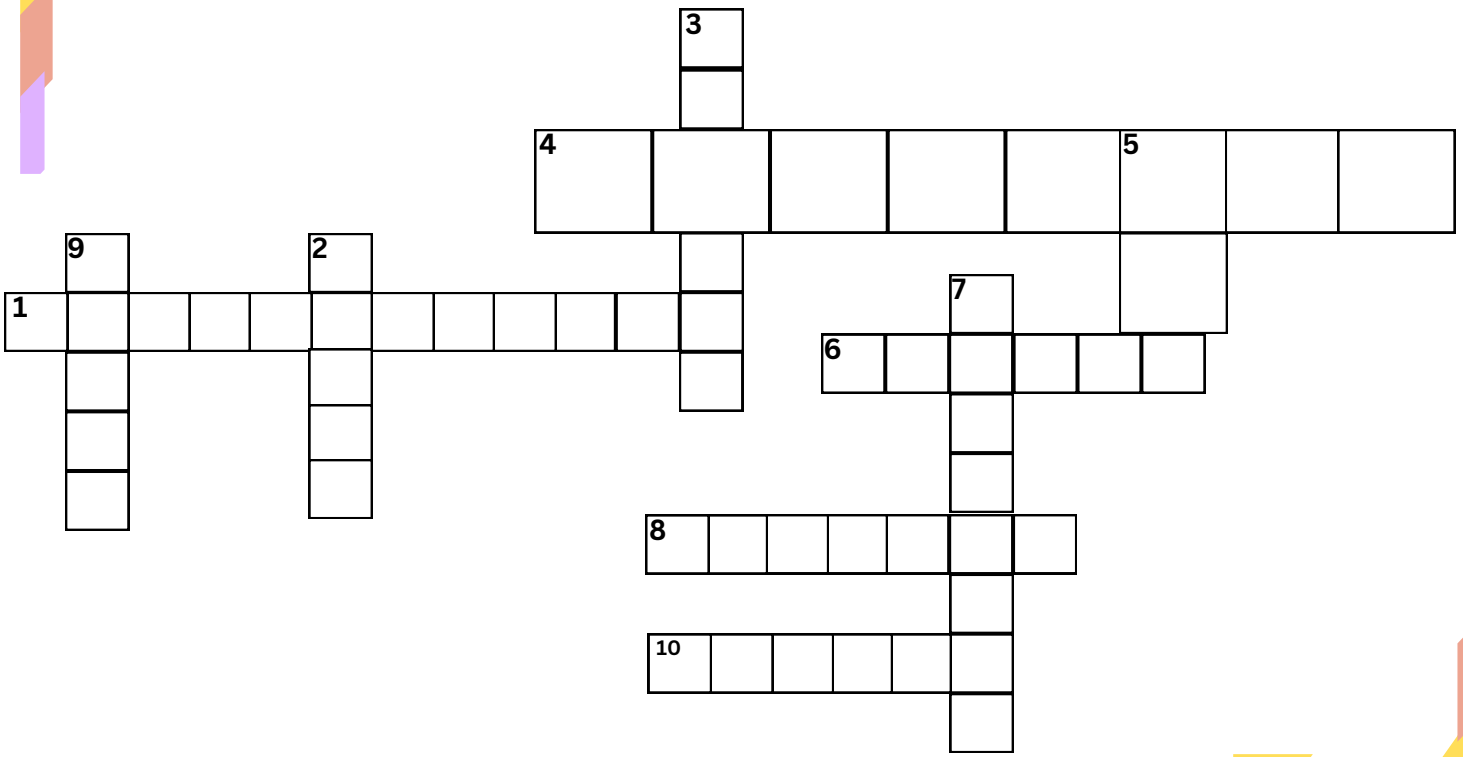
What is String Theory?

By - Bariskhem K Pohti, XII

String theory is a theoretical framework in physics that substitutes one-dimensional objects known as strings for the point-like particles of particle physics. The way these threads move through space and communicate with one another is explained by string theory. A string has the same appearance as a regular particle on distance scales greater than the string scale, with its mass, charge, and other characteristics dictated by its vibrating state. According to string theory, the graviton—a quantum mechanical particle that carries the gravitational force—represents one of the string's numerous vibrational states. Consequently, quantum gravity is a theory of string theory.

Reference - https://en.wikipedia.org/wiki/String_theory

CROSSWORD

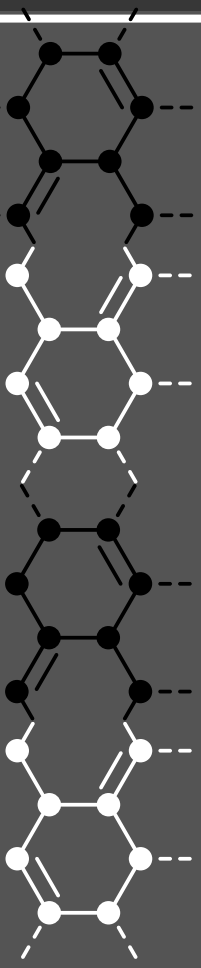


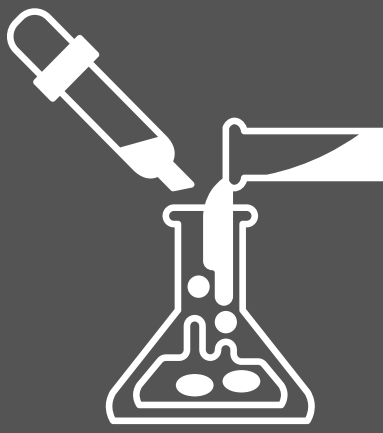
1. What is the name of the form of artificial intelligence that can take actions using past data?
2. Spring Equinox, the first day of spring in the Northern Hemisphere, usually begins in which month?
3. Which country's researchers have taken pictures of 'Upward Lightning' phenomenon?
4. Which telescope captured the 'Cassiopeia A' supernova remnant?
5. Which space agency launched the 'Jupiter Icy Moons Explorer (JUICE) project?
6. What is the scientific name for the common cold?
7. What is the largest supercomputer in the world as of January 2024?
8. Which Indian city is associated with the Indian Association for the Cultivation of Science, founded by Sir C. V. Raman?
9. Which is the only planet that spins clockwise?
10. Which is the only rock that floats?

THE NAMES OF THE FIRST THREE INDIVIDUALS SUBMITTING THE CORRECT ANSWERS WILL HAVE THEIR NAME PUBLISHED IN THE NEXT ISSUE

SUBMIT IT TO THE FOLLOWING EMAIL ID - hsmj@assamvalleyschool.com

Credits





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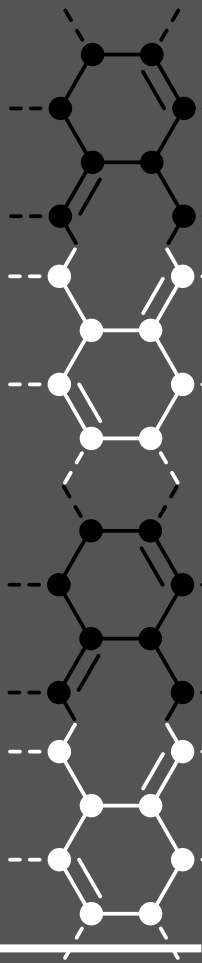

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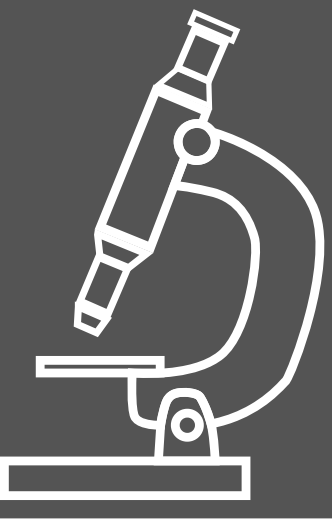

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