SPACE™
EMPOWERING LIFE

March 2026
Volume 5 | Issue III

# Galactica

## Astronomy and Space Science Magazine

What's Inside?



www.space-global.com

Galactica is a monthly magazine about astronomy & space science published by SPACE India targeting amateur astronomers. Each monthly issue includes astronomy news, space launches, what's up in the sky every month, events and announcements done by the space team, Astrophotographs and articles on astronomy & astrophysics submitted by the readers for the general audience, and the article about historical missions & events of astronomy and more. All of this comes in an easy-to-understand user-friendly style that's perfect for astronomers at any level.

# Team



**Cover Photo: Star Trail captured by Mr. Ranjith Kumar at Surya Mandir, Mahoba**


# ABOUT SPACE

Legacy of 24 years | Pioneer Organization | 10000+ Activities Developed | 1000+ Schools Associated | 1.5M+ Students Engaged | 10K+ Outreach Events | 10+ Cities Presence

**SPACE is the pioneer organization working towards the development of science and astronomy in India. It aims to create a scientifically aware society and contribute to the technological and social development of the country, SPACE organization belongs to an astronomical league. diligently working towards development in astronomy and space science through astronomical tutorials, modules, and curriculum for education requirements of schools & students in India. We constantly engage in offering introductory astronomy, science about space, astrophysics, telescopes, and internet astronomy to the masses.**

**Vision:** To popularize hands-on space science & STEM Education through various fun-filled pioneering concepts, services, and programs.

**Mission:** To develop and popularize space science & STEM Education In India and establish a global association with national & international space science agencies, societies, amateur, and professional organizations, government agencies, and space observatories.

## CMD's Message

**Dr. Sachin Bahmba, CMD, SPACE**

Space and Astronomy are the future for the young generation of our country. This is a great means to inculcate scientific temperament among the masses. Such astronomy sessions will provide a hands-on learning platform for students wherein they explore the real world of science, I wish for young students to let their ambitions soar and think big as they are the future of our country.

## Co-founder's Message

Astronomy education is important as it builds curiosity, critical thinking, and problem-solving skills, helping young minds prepare for the future. It encourages innovation, exploration, and a scientific mindset. Young learners build creativity and confidence through hands-on, experiential learning, preparing them for careers in space science and technology. We aim to cultivate future innovators who will lead progress, discovery, and global advancement.

**Ms. Shalini Bahmba, Co-founder, SPACE**

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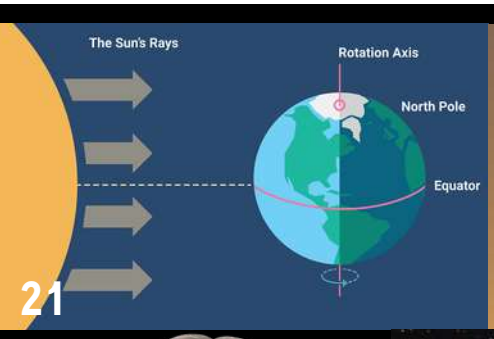
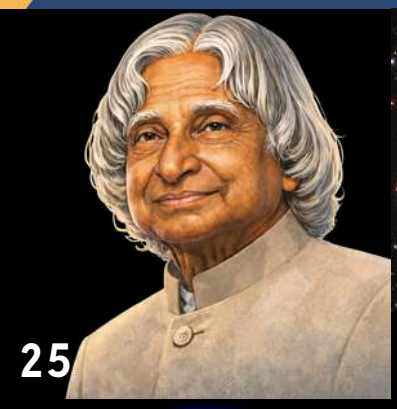
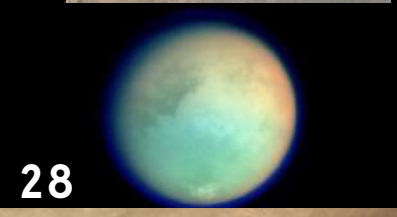






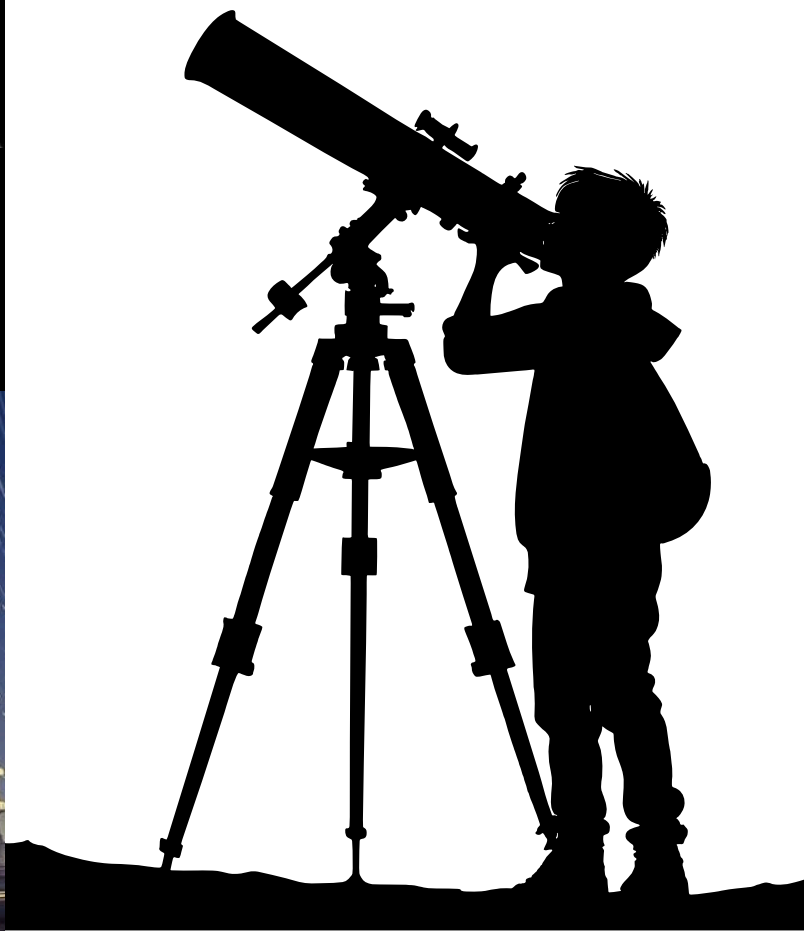












# SPACE INSIGHTS

## Antariksh Darshan 2026: Connecting Mahoba's Heritage with the Universe

In the timeless heart of Bundelkhand, where history breathes through carved stone and devotion rises with the first rays of dawn, an extraordinary transformation unfolded. The sacred precincts of the ancient Sun Temple, Mahoba, became a luminous stage for cosmic discovery as Antariksh Darshan Mahoba opened gateways to the universe for thousands of young minds and curious citizens.

Organised through a visionary collaboration between the District Administration, Mahoba and SPACE India, this four day district level science outreach programme, held from 11 to 14 February 2026 on the occasion of the Foundation Day of Janpad Mahoba, emerged as a powerful confluence of heritage, governance, science, and public aspiration. The programme commenced with a traditional Aarti and collective prayer to the Sun, symbolising the harmonious integration of India's ancient cosmic reverence with its modern scientific spirit.


Guided by the inspiring leadership of the Hon'ble District Magistrate, Ms. Ghazal Bhardwaj, and shaped by the educational vision of Dr. Sachin Bahmba, Founder of SPACE Group, the initiative transformed the Sun Temple into a dynamic space science learning hub. Digital planetarium shows, immersive virtual reality space simulations, telescope based solar and night sky observations, and hands on workshops created a vibrant ecosystem where wonder evolved into understanding and curiosity matured into knowledge.

Across four days, over 2,000 students and 1,200 members of the general public participated, many travelling from distant villages by walking, cycling, and public transport, driven by aspiration and a deep desire to learn. As dusk settled, telescopes unveiled the Moon, Orion Nebula, and shimmering constellations, while young explorers traced the skies with awe.

More than an event, Antariksh Darshan became a bridge between heritage and the cosmos – where ancient stones echoed stories of the universe, young minds dared to dream and Mahoba discovered its place beneath the infinite sky.

# A Night of Cosmic Discovery at Casagrand International School, Arisers Campus

On the evening of 28th February 2026, the campus of Casagrand International School, Arisers Campus transformed into a gateway to the universe. Students of Grades VII, VIII, and IX gathered for a memorable Star Party and Evening Sky Observation Program, where curiosity met the cosmos and learning extended far beyond the classroom walls.

The evening began with an engaging indoor session where students explored how astronomers plan sky observations. Using the planetarium software Stellarium, they learned how celestial objects can be identified and tracked across the night sky. The session also featured a short documentary, "Farther and Faster: NASA's Journey to the Moon with Artemis," introducing students to the ambitious Artemis Program led by NASA, which aims to return humans to the Moon and prepare for future exploration beyond.

As darkness gently settled over the campus, the program moved outdoors for the much-anticipated telescope observation. With excitement in their eyes, students took turns peering through telescopes to witness the brilliance of Jupiter and its Galilean Moons, the glowing beauty of the Orion Nebula, and the captivating details of the Moon.

The experience sparked wonder and excitement among the students, turning the night sky into a living classroom. For many, it was their first close encounter with the universe through a telescope—an inspiring moment that ignited curiosity and imagination.

That evening, beneath a sky full of stars, Casagrand International School, Arisers Campus reminded its young learners that sometimes the greatest lessons begin simply by looking up.

# Victoria School CBSE Hosts a Cosmic Carnival Celebrating National Science Day

On the evening of 28th February 2026, the Victoria School CBSE campus, in collaboration with SPACE India, transformed into a vibrant hub of astronomy and scientific celebration. Organised in honour of National Science Day and the much-awaited Planetary Parade, the Cosmic Carnival brought together students, parents, and astronomy enthusiasts for an engaging exploration of space science under the night sky.

The evening began at 6:30 p.m. with a series of interactive activity stations designed to combine fun with scientific discovery. Participants enthusiastically engaged in activities such as Ring the Planet, Spot the Star, Space Card Challenge, and Explore the Moon, each encouraging curiosity and helping learners understand basic astronomical concepts through hands-on participation. Adding to the excitement, students also performed a lively planet-themed dance, energizing the audience between sessions.

As darkness set in, the highlight of the evening—the Evening Sky Tour—began. Participants gathered around telescopes to observe Jupiter and its Galilean moons, the Pleiades star cluster, the Orion Nebula, and the Moon in remarkable detail. A 76 mm Newtonian reflector telescope provided students with a special hands-on opportunity to align the telescope and locate the Moon themselves, turning observation into an interactive learning experience.

The event concluded at 9:30 p.m., leaving participants inspired by the wonders of the universe. All students received certificates of participation from SPACE India, marking the success of an evening that beautifully blended science, creativity, and community engagement beneath the open sky.

# HIGHLIGHTS OF FEBRUARY 2026

## Apollo Samples Reveal the Truth Behind Lunar Magnetism

More than fifty years ago, astronauts from the Apollo program brought back several rock samples from the surface of the Moon. These lunar samples have continued to provide valuable insights into the Moon's history. Recently, scientists studying these rocks may have finally solved a long-standing mystery about the Moon's magnetic past.

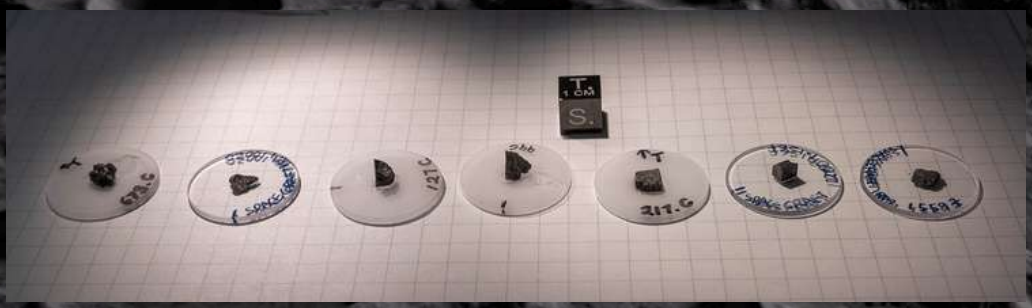
Why Was This a Mystery?
When scientists first examined the Apollo moon rocks, some of them showed strong magnetic signals. This was surprising because such magnetism usually indicates the presence of a powerful planetary magnetic field. On planets like the Earth, this magnetic field is produced by a process called a dynamo inside the molten core. However, the Moon's core is relatively small, making it difficult to explain how it could have produced such a strong magnetic field in the past.

What Did Scientists Discover?
Using modern laboratory techniques, researchers recently re-examined these Apollo samples. They found that the magnetism recorded in some rocks may not have been produced by a long-lasting global magnetic field. Instead, it was likely caused by short and intense magnetic events triggered by large asteroid impacts on the Moon.

What Type of Magnetic Field Was It?
According to the new findings, these impacts created extremely hot plasma and shock waves that briefly generated powerful magnetic fields around the impact site. Rocks that formed or cooled during these events captured and preserved this temporary magnetism.

What Does This Mean?
This discovery suggests that the Moon probably had a much weaker and shorter-lived magnetic environment than previously believed. The strong magnetism seen in certain rocks may simply be the result of rare impact events rather than evidence of a long-lasting lunar dynamo.

The study highlights the continued scientific value of Apollo mission samples. Even decades later, these rocks are helping scientists better understand the formation and evolution of the Moon and the dynamic processes that shaped its early history.



Lunar samples displayed in the paleomagnetism lab at Stanford. (Image credit: Harry Gregory)

# Space-Grown Mushrooms: A New Chapter in Space Food Research

Scientists and researchers are constantly exploring new ways to grow food in space, especially as humanity plans for longer missions beyond Earth. In an unusual but exciting experiment, mushrooms grown aboard the International Space Station were recently brought back to Earth and tasted by scientists—who happily reported that they survived the experience.

## Why Grow Food in Space?

As space agencies plan future missions to destinations like the Moon and Mars, astronauts will need reliable food sources during long journeys. Carrying all the food from Earth is not practical for extended missions. Therefore, scientists are studying how to grow fresh food in space using limited resources.

Mushrooms are considered a promising candidate because they grow quickly, require little space, and do not need sunlight like most plants. Instead, they grow on organic material, making them suitable for controlled environments such as spacecraft or space stations.

## What Was the Experiment?

In this experiment, mushrooms were cultivated in microgravity conditions aboard the International Space Station. Researchers monitored how the absence of gravity affected their growth, structure, and nutritional value. After the mushrooms were returned to Earth, scientists carefully tested and tasted them to ensure they were safe for consumption.

## What Did Scientists Discover?

The results were encouraging. The mushrooms grew successfully in space and remained safe to eat after returning to Earth. Scientists reported that their taste and texture were similar to mushrooms grown on Earth, suggesting that fungi can adapt well to space environments.

## What Type of Food Could Be Grown in Space?

Experiments like this show that fungi and other simple organisms may play an important role in future space farming systems. Along with crops such as lettuce and tomatoes already grown in orbit, mushrooms could become part of a sustainable food supply for astronauts.

As space exploration advances, food grown beyond Earth may soon become a normal part of life for astronauts—and perhaps even future space settlers. What once sounded like science fiction is slowly becoming reality, one space-grown mushroom at a time.

# A New Navigation System on Mars: Perseverance Gets Its Own "GPS"

Exploring another planet is never easy. Unlike on Earth, there are no satellites orbiting the planet to provide navigation systems like GPS. However, scientists have now given the Perseverance Rover a new ability that works like a GPS system on the Mars.

On Earth, devices use the Global Positioning System to determine their exact location using satellites orbiting the planet. But Mars does not yet have a satellite navigation network. This makes it harder for rovers to determine their precise location while exploring the Martian surface.

Rovers usually rely on images of the terrain, onboard sensors, and communication with orbiters to understand where they are. While this method works, it can be slow and sometimes less accurate when the rover is traveling long distances.

Scientists working with NASA have developed a new navigation capability for Perseverance. This system uses signals from Mars orbiters to help the rover determine its position more precisely. In simple terms, the rover can now use these orbiting spacecraft as reference points, similar to how GPS satellites work on Earth.

This new capability allows the rover to better track its movement and location on Mars. With improved navigation, Perseverance can explore the Martian surface more efficiently and safely. It also helps mission teams on Earth plan routes and scientific observations more accurately.

This development could be a major step toward building a real navigation network on Mars in the future. As more spacecraft and missions arrive at the planet, a satellite-based navigation system could help guide rovers, landers, and even future astronauts.

Giving Perseverance its own "GPS-like" ability shows how technology continues to evolve during missions. Even millions of kilometers away from Earth, engineers are still improving the rover's capabilities and helping it explore Mars more effectively.

# First 3D Map of Uranus' Auroras Created by James Webb Telescope

The James Webb Space Telescope has achieved a remarkable milestone by creating the first three-dimensional map of auroras on Uranus. Auroras are glowing light displays that occur when energetic charged particles from the Sun interact with a planet's magnetic field and atmosphere. Similar to the Northern and Southern Lights on Earth, these luminous events can also be found on several planets across the solar system.

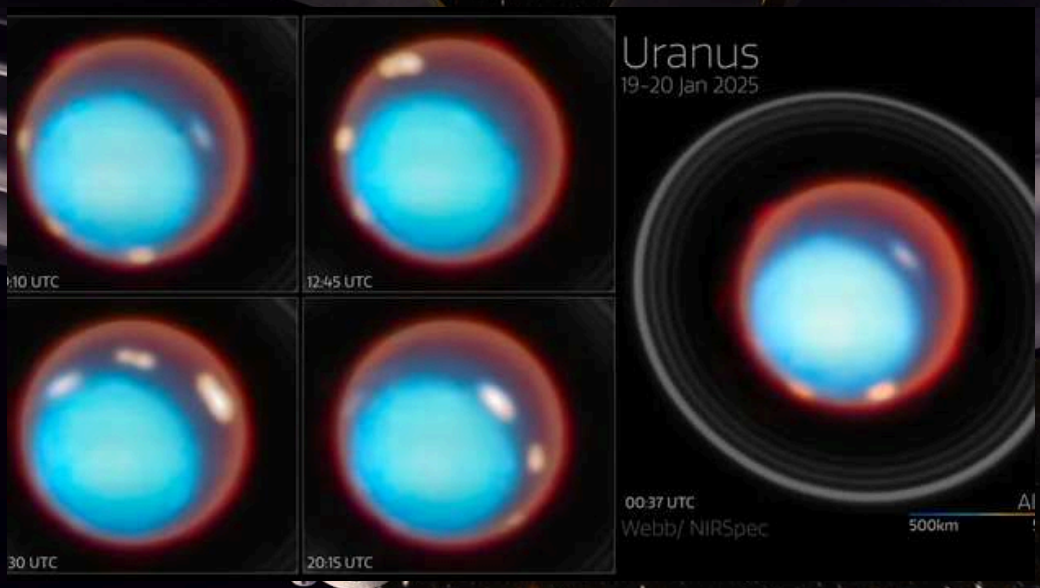
However, studying them on Uranus has always been difficult because the planet is extremely far away and possesses a very unusual orientation. Uranus rotates on its side with an axial tilt of about 98 degrees, and its magnetic field is both tilted and shifted away from the planet's center. This strange configuration causes its auroras to behave differently from those on other planets such as Jupiter and Saturn.

Using Webb's highly sensitive infrared instruments, astronomers were able to observe the glow produced in Uranus's upper atmosphere and reconstruct the structure of its auroras in three dimensions for the first time.

This detailed mapping allows scientists to better understand how charged particles travel along magnetic field lines and interact with the planet's atmosphere. The discovery provides valuable clues about Uranus's magnetosphere and its response to the solar wind, marking an important step in understanding the complex environments of the outer planets.

Key Findings:

- 3D Auroral Mapping: The data reveals two bright auroral bands near Uranus's magnetic poles, which are tilted and offset from the planet's rotation axis.
- Cooling Upper Atmosphere: The observations confirm that Uranus's upper atmosphere has continued to cool since the early 1990s, with average temperatures around
- Structure: Ion density peaks at approximately 1,000 km, while temperature peaks between 3,000 and 4,000 km above the cloud tops.
- Atmospheric Energy: The findings help explain how Uranus's lopsided magnetic field channels energy, causing complex auroral activity that differs from Earth's.




Multiple views of Uranus, as seen by the James Webb Space Telescope's NIRSpec instrument during a 15-hour period in late January 2025. The ice giant's auroras appear as rosy splotches and help track temperatures and dynamics in the planet's upper atmosphere.
Credits:ESA/Webb, NASA, CSA, STScI, P. Tiranti, H. Melin, M. Zamani (ESA/Webb)

# From Gaganyaan to the Moon: India's Space Plans in the 2026 Budget

India's space sector has received a modest increase of about two percent in the 2026 national budget, reflecting steady support for the country's growing ambitions in space exploration and technology. The budget allocated to the Indian Space Research Organisation highlights the government's intention to continue investing in important missions while carefully balancing other national priorities. Although the increase may appear small compared with some other sectors, it plays an important role in maintaining the progress of India's expanding space programme.

One of the main reasons for this budget allocation is to support several major upcoming missions. Space missions require years of preparation, advanced technology, and continuous testing, which makes consistent funding essential. A significant portion of the funding will support the development of Gaganyaan, India's first human spaceflight programme. This mission aims to send Indian astronauts into space aboard an indigenous spacecraft. The programme involves complex systems such as astronaut training, life-support systems, crew safety mechanisms, and advanced spacecraft design.

Another important area of focus is the continued use and development of India's heavy-lift launch vehicle, the LVM3. This rocket has already demonstrated its reliability by launching several important missions and satellites. It will play a major role in future human spaceflight missions, deep-space exploration projects, and large satellite launches. The budget will support improvements in launch infrastructure, rocket technology, and mission planning.

The funding will also support different types of satellite missions that serve practical purposes on Earth. Earth-observation satellites are essential for monitoring weather patterns, tracking cyclones, studying climate change, managing natural resources, and assisting in disaster management. These satellites help scientists and government agencies make better decisions that affect agriculture, environmental protection, and public safety.

In addition to Earth-focused missions, India continues to strengthen its planetary exploration programme. The success of Chandrayaan-3 demonstrated India's growing capability in lunar exploration and advanced landing technology. Scientists are now planning more ambitious missions, including future lunar exploration and possible sample-return missions that could bring pieces of the Moon back to Earth for detailed study.

Another important aspect of the space budget is the support for India's rapidly growing private space sector. In recent years, many startups and private companies have begun contributing to satellite development, launch services, and innovative space technologies. Government funding helps encourage research, collaboration, and technological development within this expanding ecosystem.

Overall, the 2026 space budget reflects a balanced and strategic approach to strengthening India's position in the global space community. Even a modest increase ensures that key missions continue to move forward while supporting scientific research, technological innovation, and long-term exploration goals. As India advances toward human spaceflight and deeper exploration of space, sustained investment will remain crucial in shaping the future of the nation's space programme.

# NASA Postpones Artemis II Mission Due to Rocket Fuel Leak

The NASA has once again delayed the launch of its important lunar mission, Artemis II, due to a fuel leak detected during testing of the rocket systems. Artemis II is a key mission in the Artemis Program, which aims to send astronauts back to the Moon for the first time since the historic Apollo 17 in 1972.

The delay occurred during preparations involving the powerful Space Launch System, the rocket designed to carry astronauts beyond low Earth orbit. Engineers discovered a fuel leak in the system that supplies liquid hydrogen and liquid oxygen to the rocket. These fuels are extremely sensitive and must be handled with great care. Even a small leak can create serious safety risks, especially during a crewed mission where astronauts are onboard. As a result, NASA decided to postpone the launch until the issue can be fully investigated and resolved.

Artemis II will carry four astronauts aboard the Orion spacecraft on a journey around the Moon. Unlike earlier lunar missions that landed on the surface, this mission will perform a flyby of the Moon and then return to Earth. The main purpose of the mission is to test the spacecraft's life-support systems, navigation, communication, and overall performance with astronauts onboard. These tests are essential before NASA attempts a human landing on the Moon again.

The mission is an important step toward the next phase of lunar exploration. After Artemis II, NASA plans to launch Artemis III, which is expected to land astronauts on the lunar surface and mark a new era of human exploration.

Although delays may slow the schedule, safety remains the top priority for space agencies. Careful inspections and repairs ensure that both the astronauts and the spacecraft are fully prepared for the challenges of deep-space travel. Once the technical issues are resolved, Artemis II will move closer to launching humans on a historic journey around the Moon.

# WHAT'S UP IN THE SKY -MARCH 2026

## LUNAR CALENDAR


## IMPORTANCE OF MOON PHASES FOR STARGAZERS

One might wonder why it is important to refer to moon phases for star gazing. The reason is that the phases of the Moon reflect a great deal of illumination, and because the Moon is so close to us, it overrides the brightness of other celestial objects.

So, What Moon phase is best for stargazing? "The New Moon and the days immediately before and after the new moon (Crescent phases)" are among the best times for stargazing. Whereas the Remaining phases like Full Moon, waxing or waning gibbous, the first or third quarter Moon offers a time to zoom in and witness the features of the Moon.

## PLANETS VISIBILITY

**Mercury**
Dim evening planet at start of month. 7 March inferior conjunction, poorly placed morning object after that.

**Venus**
Evening planet setting 70 minutes after sunset on 1 March. 3%-lit waxing crescent Moon close on 20th.

**Mars**
Lost in the sun's glare and will remain hidden until early spring 2026.

**Jupiter**
Bright evening planet,61%-lit waxing gibbous Moon nearby on evening of 26 March.

**Saturn**
Evening planet in Pisces, too close to Sun to view. Solar conjunction 25 March.

**Uranus**
Evening planet, losing altitude through the month.

**Neptune**
Ble ice gaint,Too close to Sun to be seen.

## BRIGHT DEEP SKY OBJECTS

The Messier 45 also known as the Pleiades or Seven Sisters, is a bright open star cluster located in the constellation Taurus. It has an apparent magnitude of 1.6 and lies at an average distance of 444 light years from Earth. Finding M45 is easy, the cluster is positioned about 14 degrees northwest of orange giant star Aldebaran (mag. +0.9), the brightest star in Taurus.

Messier 35 is a large open star cluster located in the northern constellation Gemini. The cluster consists of several hundred stars. The beautiful open cluster M35 reaches its highest position in the sky, due south, around 20:00 UT. The cluster is just visible to the naked eye, and a real treat through binoculars or a small scope.

M44 also known as the Praesepe or the Beehive cluster is an open cluster spanning some 15 light-years, M44 holds 1,000 stars or so and covers 1.5 degrees on the sky in the constellation Cancer. Described as a faint cloud long before being included as the 44th entry in Charles Messier's catalog, the cluster was not resolved into its individual stars until telescopes were available.

M41 is a stunning, large bright open cluster located in the constellation of Canis Major. Of the many clusters in Canis Major, it's the stand out object and the constellation's only Messier object, but easy to find since it's positioned just four degrees south of Sirius. With an apparent mag. of +4.5, the cluster is visible to the naked eye. It covers 39 arc minutes of apparent sky.

# Rocket launches in March 2026

## GISAT-1A (EOS-05)

Scheduled for launch in March 2026, ISRO's GSLV Mk II (F17) will deploy GISAT-1A (also known as EOS-05) from the Satish Dhawan Space Centre in Sriharikota, India. The Earth observation satellite will operate in geostationary orbit, providing near real time imaging of the Indian subcontinent with multispectral and hyperspectral sensors to support disaster monitoring, weather analysis, and environmental management.

GISAT-1A replaces the earlier GISAT-1 mission that failed to reach orbit and enhances India's ability to capture frequent, wide area images for applications like agriculture, oceanography, and resource planning.

GSLV Mk II Rocket (Credit: ISRO)

## TV-D2

Gaganyaan Abort Test Booster I(Credit: ISRO)

Scheduled for launch in March 2026, ISRO's TV-D2 mission will lift off from the Satish Dhawan Space Centre First Launch Pad as part of India's Gaganyaan human spaceflight programme. It is the second in flight abort test designed to validate the crew escape system under different flight conditions, ensuring astronaut safety in case of an emergency during launch.

This suborbital test follows the earlier TV-D1 abort demonstration and helps prepare for subsequent uncrewed and crewed Gaganyaan missions by proving critical safety technologies for India's first human spaceflight.

## EOS-10 (OCEANSAT-3A)

Scheduled for launch in March 2026, ISRO's PSLV-XL will deploy EOS-10 (Oceansat-3A) from the Satish Dhawan Space Centre's First Launch Pad in India. Oceansat-3A is an Earth observation satellite in the Oceansat programme designed to monitor the world's oceans and coastal zones from Sun synchronous orbit using instruments such as an Ocean Colour Monitor, Scatterometer, and Sea Surface Temperature Monitor.

The mission will provide vital data on ocean colour, surface winds, temperature, and marine ecosystems, supporting weather forecasting, climate studies, and fisheries management. By continuing the Oceansat series, EOS-10 reinforces India's capabilities in oceanography and Environmental Science.

PSLV-XL Rocket (Credit: ISRO)

# GSAT-32

Scheduled for launch in March 2026, ISRO's GSLV Mk II rocket will deploy GSAT-32 from the Satish Dhawan Space Centre, Sriharikota, India. The satellite is an Indian geostationary communications spacecraft designed to provide long term telecommunications services from geostationary orbit.

Built by the U.R. Rao Satellite Centre with a planned service life of about 15 years, GSAT-32 will support a range of communication functions, enhancing connectivity and service continuity for civilian and strategic users. Its deployment strengthens India's growing fleet of geostationary satellites and advances national communication infrastructure objectives.

GSLV Mk II Rocket
(Credit: ISRO)

# ARTEMIS II

SLS Block 1 Rocket
(Credit: NASA)

Scheduled for launch in March 2026, NASA's Space Launch System (SLS) Block 1 will carry the Artemis II mission from Kennedy Space Center. The mission will send four astronauts aboard the Orion spacecraft on a 10 day crewed lunar flyby, traveling around the Moon and returning safely to Earth.

Artemis II will be the first human spaceflight beyond low Earth orbit since Apollo 17, testing life support systems, navigation, guidance controls, and deep space communication technologies required for future lunar missions.

The crew includes Reid Wiseman, Victor Glover, Christina Koch, and Jeremy Hansen. During the mission, astronauts will evaluate spacecraft performance in deep space, practice manual spacecraft operations, and conduct imaging and Earth Moon observations.

Artemis II will also demonstrate international cooperation between NASA and the Canadian Space Agency. The mission is a crucial step toward future Artemis missions that aim to land astronauts near the Moon's south pole and establish a long term human presence for scientific research and preparation for eventual missions to Mars.

****Note: Launch dates of the missions are scheduled to be launched in March 2026, but may be subject to change.**

# Setbacks That Built Space Success

## VENERA 4: BENEATH THE CLOUDS OF VENUS

What was the Venera Mission?
The Venera program was the Soviet Union's ambitious attempt to explore Venus during the Space Race. The first two missions failed after launch, and Venera 3, launched in 1965, likely crashed onto Venus, becoming the first human-made object to reach another planet, but it returned no data due to lost communication.

On 18 October 1967, Venera 4 succeeded where others had not. It became the first spacecraft to enter another planet's atmosphere and transmit data back to Earth. After a four-month journey, it descended through Venus's thick clouds, sending measurements of temperature, pressure, and atmospheric composition.

Designed to attempt a soft landing in case oceans existed, it was tracked during descent by observatories including the Jodrell Bank Observatory, marking humanity's first direct study of another planet's atmosphere.


The Soviet Union's Venera 4 spacecraft.
(Credit: NASA)

Why It Failed?
Although Venera 4 achieved a historic first, it was not built for the true fury of Venus. Communication with the probe was lost just 94 minutes after it entered the atmosphere, when it was still about 25 kilometers above the surface. At the time of its design, scientists had underestimated how extreme Venus's conditions really were.

Later measurements revealed that the atmospheric pressure near the surface is about 90 times greater than Earth's atmosphere; powerful enough to crush the spacecraft during its descent. In addition, surface temperatures of around 480°C, hot enough to melt lead, meant that even if it had survived the pressure, it would not have lasted long.

What We Learned From This Mission:
Despite its loss, Venera 4 transformed our understanding of Venus. It confirmed that the planet's atmosphere is dominated by carbon dioxide and revealed the extreme heat and crushing pressure that make Venus one of the most hostile worlds in the Solar System. These findings ended speculation about oceans or life and forced engineers to design stronger spacecraft.

Just three years later, Venera 7 successfully landed on Venus. Venera 4 proved that even a mission that doesn't fully succeed can revolutionize science and open the door to future triumphs.

# Space Paradoxes: Glitches in the Cosmos

## THE SILENT COSMIC PARTY: UNDERSTANDING THE FERMI PARADOX

**The Empty Party Hall:** Imagine being invited to a huge birthday party in a gigantic banquet hall. The hall is large enough for billions of guests. The decorations are perfect, the food is ready, the lights are on, and the music system is set.

You expect laughter, conversations, and excitement. But when you walk inside… it's completely silent.

The cake is untouched. The chairs are neatly arranged. Everything is ready for the celebration, yet no one is there. This strange silence is similar to one of the biggest mysteries in astronomy.


The Allen Telescope Array are used in part to search for signals from extraterrestrials. (Credit: The SETI Institute)

**Fermi's Big Question:**

In 1950, physicist Enrico Fermi asked a simple but powerful question during a discussion about alien life:

"Where is everybody?"

Our galaxy, the Milky Way, contains hundreds of billions of stars, many with planets. Some of these planets may have conditions suitable for life. Since the galaxy is more than 13 billion years old, intelligent civilizations could have had plenty of time to develop advanced technology and explore space.

If that is the case, why haven't we seen any evidence of them?

**Possible Explanations:**

Scientists have suggested several ideas to explain this mystery:

- Life may be very rare. The conditions that allowed life to begin on Earth might be extremely uncommon.
- Intelligent life may not last long. Civilizations could destroy themselves before spreading into space.
- Space is enormous. Signals may take thousands or millions of years to reach us.
- Civilizations may stay silent. Advanced societies might choose not to broadcast their presence.
- We have just started searching. Humans have been listening for signals for only about a century.

**A Mystery That Remains:**

The Fermi Paradox continues to puzzle scientists. Are we truly alone in the universe, or are other civilizations simply too far away for us to detect?

For now, humanity continues to search the skies.

Perhaps one day we will discover that the cosmic party hall isn't empty after all–we may simply be the first guests to arrive.

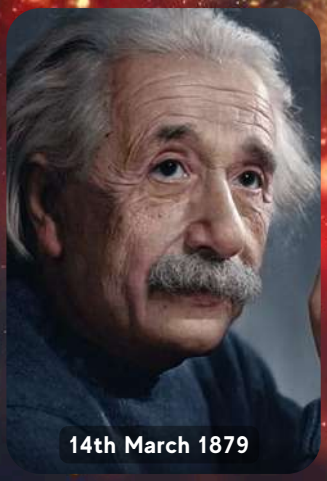
# Happy Birthday


## Joseph von Fraunhofer

Joseph von Fraunhofer was born on March 6, 1787, in Straubing, Bavaria. He was a German physicist and optical scientist who discovered and mapped the dark lines in the Sun's spectrum, now known as Fraunhofer lines. His work laid the foundation for spectroscopy, helping scientists study the composition of stars. He also improved telescope lenses and optical instruments. Fraunhofer died on June 7, 1826, leaving a lasting impact on astronomy.Credits: fraunhofer.de

## John Herschel


John Herschel was born on March 7, 1792, in Slough, England. He was a British astronomer, mathematician, and chemist who expanded the study of the night sky, especially in the Southern Hemisphere. He catalogued thousands of stars, nebulae, and double stars, continuing the work of his father, William Herschel. He also contributed to early photography and helped standardize astronomical terminology. Herschel died on May 11, 1871, leaving a lasting legacy in astronomy. Credits:themarginalian




## Albert Einstein

Albert Einstein was born on March 14, 1879, in Ulm, Germany. He was a theoretical physicist best known for developing the theory of relativity, including the famous equation $E = mc^2$. His work revolutionized our understanding of space, time, gravity, and the universe. Einstein also explained the photoelectric effect, for which he won the Nobel Prize in Physics in 1921. He died on April 18, 1955, leaving a profound impact on modern physics and cosmology.

# Happy Birthday


## Kalpana Chawla

Kalpana Chawla was born on March 17, 1962, in Karnal, India. She became the first woman of Indian origin to travel to space as a NASA astronaut. She flew on Space Shuttle Columbia in 1997 and again in 2003. Chawla contributed to scientific experiments in microgravity and inspired millions worldwide. She tragically lost her life in the Space Shuttle Columbia disaster on February 1, 2003, but her legacy continues to motivate future space explorers.

## Govind Swarup

Govind Swarup was born on March 23, 1929, in Thakurdwara, Uttar Pradesh, India. He was a pioneering Indian radio astronomer and is best known as the founder of the Ooty Radio Telescope and the Giant Metrewave Radio Telescope (GMRT). His work established India as a global leader in radio astronomy. Swarup played a key role in advancing the study of galaxies, quasars, and cosmic radio sources. He passed away on September 7, 2020, leaving a lasting legacy in Indian space science.



## Thanu padmanabhan

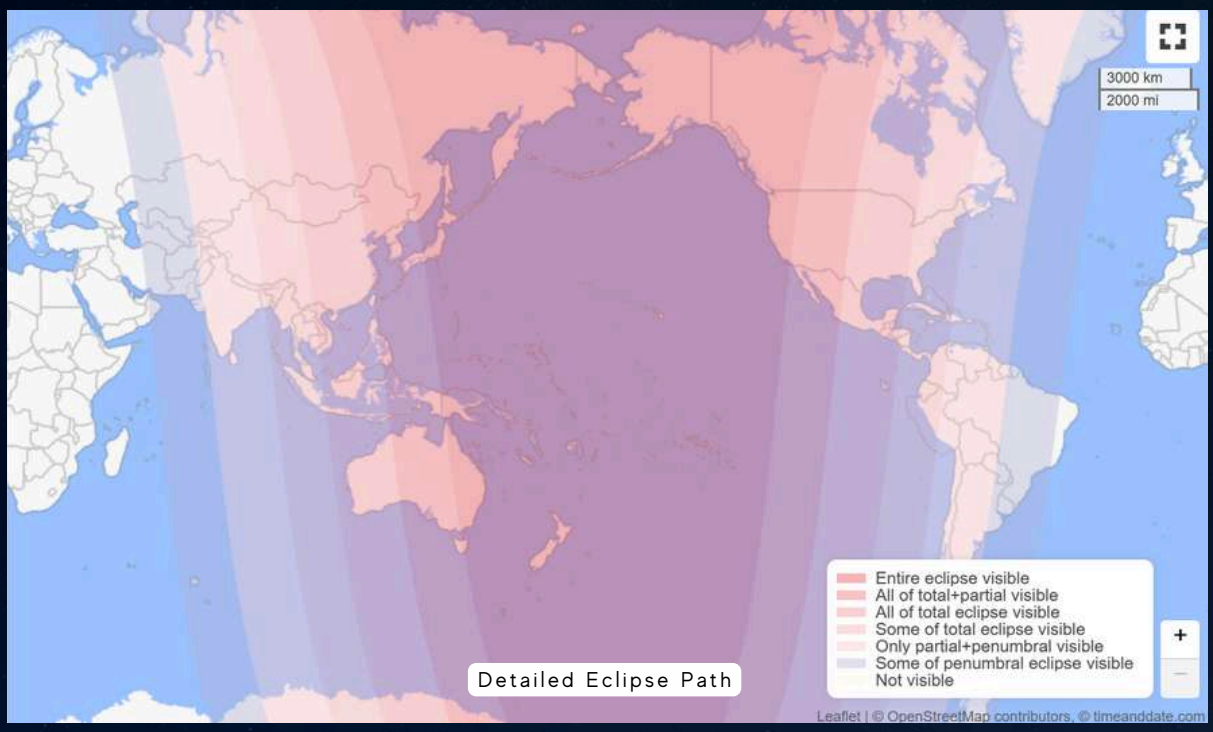
Thanu Padmanabhan was born on March 10, 1957, in Thiruvananthapuram, India. He was a renowned Indian theoretical physicist and cosmologist known for his groundbreaking work on dark energy, gravity, and the thermodynamics of spacetime. Padmanabhan made significant contributions to our understanding of the expanding universe and cosmic structure formation. He was also a gifted science communicator and author. He passed away on September 17, 2021, leaving a profound impact on modern cosmology and theoretical physics.

# Celestial Spectacles

## A Short but Spectacular Lunar Eclipse

Skywatchers across India will have an opportunity to witness an interesting celestial event on March 3, 2026, when a partial lunar eclipse becomes visible shortly after moonrise. Although the eclipse will be seen as a total lunar eclipse in some parts of the world, observers in most regions of India will be able to catch only the final partial phase of the event in the early evening sky.

A lunar eclipse occurs when the Earth comes directly between the Sun and the Moon, casting its shadow on the lunar surface. As the Moon moves through Earth's shadow, a portion of its bright disk gradually darkens. During deeper phases of a lunar eclipse, the Moon can sometimes appear reddish, a phenomenon popularly known as a "Blood Moon." This reddish glow occurs because Earth's atmosphere bends sunlight toward the Moon while filtering out the shorter blue wavelengths.




The earlier stages of the eclipse will take place before moonrise in India. As a result, observers will see the Moon already partially covered by Earth's shadow as it rises in the eastern sky. The eclipse will be visible for a limited duration after moonrise, providing a brief but fascinating view of the celestial alignment between the Sun, Earth, and Moon.

One of the advantages of observing a lunar eclipse is that it is completely safe to view with the naked eye, unlike a solar eclipse. However, using binoculars or a small telescope can enhance the experience by revealing more details of the Moon's surface and the gradual movement of Earth's shadow.

Astronomy enthusiasts, students, and sky lovers are encouraged to step outside and watch this rare alignment unfold. With clear skies and an unobstructed eastern horizon, the March 3, 2026 partial lunar eclipse promises to be a memorable event for observers across the country.

# Fiery Trails of the South: The Gamma Normids Meteor Shower

Position of the radiant in the constellation Noma.
Credit: www.rappler.com

On March 14 the Gamma Normids meteor shower reaches its peak, offering a modest yet beautiful display for dedicated skywatchers. Best visible from the Southern Hemisphere, this shower produces around 3–6 meteors per hour, with activity rising after midnight until 4:00 AM IST.

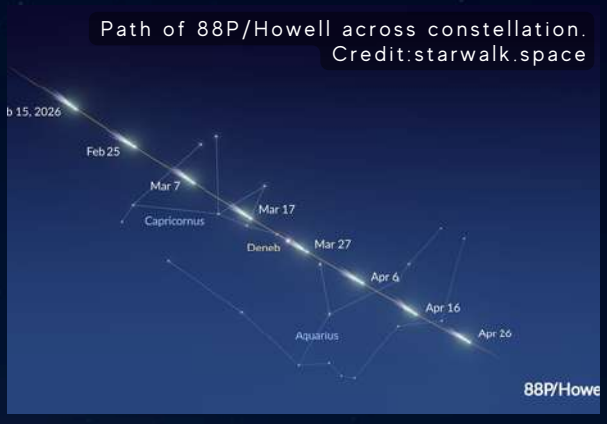
The meteors radiate from the constellation Norma, located low in the southern sky, so observers should watch 20–40 degrees above the southern horizon for the best view. These swift meteors create delicate streaks that reward those who enjoy peaceful, late-night stargazing. A dark, unobstructed southern horizon greatly enhances the experience.

With patience, observers may notice occasional slightly brighter meteors standing out against the faint background. The shower's subtle nature makes it a perfect opportunity to practice relaxed wide-angle skywatching.

# Early-Morning Target: Comet 88P/Howell at Perihelion

On March 18 Comet 88P/Howell reaches perihelion, marking its closest point to the Sun and the moment when its activity and brightness typically increase. Although not visible to the naked eye, this short-period comet becomes an exciting target for binoculars and small telescopes under dark, early-morning skies. The best time to observe is around 4:30–5:30 AM IST, before dawn washes out faint details.

Path of 88P/Howell across constellation.
Credit:starwalk.space




As the comet warms near the Sun, its coma may brighten slightly, making it ideal for enthusiasts who enjoy tracking periodic comets and observing subtle changes across successive mornings. Because Howell follows a well-studied orbit, its motion can be easily followed using updated sky charts or astronomy apps. Observers may also notice gradual growth in its tail as solar radiation intensifies. The comet's slow drift against the background stars provides a rewarding challenge for patient skywatchers. Even though it remains faint, Howell offers a rare chance to witness a returning comet at an active stage of its journey.

# ZODIACAL LIGHT – A SUBTLE GLOW OF THE SOLAR SYSTEM

Around the New Moon on March 19, skywatchers in India may have a chance to observe the beautiful and subtle phenomenon known as Zodiacal Light. This faint, triangular glow appears in the western sky about 90 minutes after sunset, rising upward from the horizon like a soft pyramid of light.

Zodiacal Light is created when sunlight scatters off countless tiny dust particles spread throughout the inner Solar System. These particles lie along the plane of the Solar System, known as the ecliptic, which is why the glow follows the path of the zodiac constellations–hence the name Zodiacal Light.

This image beautifully captures the zodiacal light, a triangular glow seen best in night skies free of overpowering moonlight and light pollution. The photograph was taken at ESO's La Silla Observatory in Chile in September 2009, facing west some minutes after the Sun had set. A sea of clouds has settled in the valley below La Silla, which sits at an altitude of 2400 metres, with lesser peaks and ridges poking through the mist. Credit: ESO/Y. Beletsky

For observers in India, mid-March evenings provide one of the best opportunities of the year to see this phenomenon. The glow becomes visible after twilight fades, especially from dark locations away from city lights with a clear western horizon.

Although delicate and often overlooked, Zodiacal Light is a reminder that our Solar System is filled with fine cosmic dust illuminated by the Sun. With patience and dark skies, observers may witness this serene celestial glow quietly rising above the horizon.

# EQUAL DAY, EQUAL NIGHT: THE MARCH EQUINOX

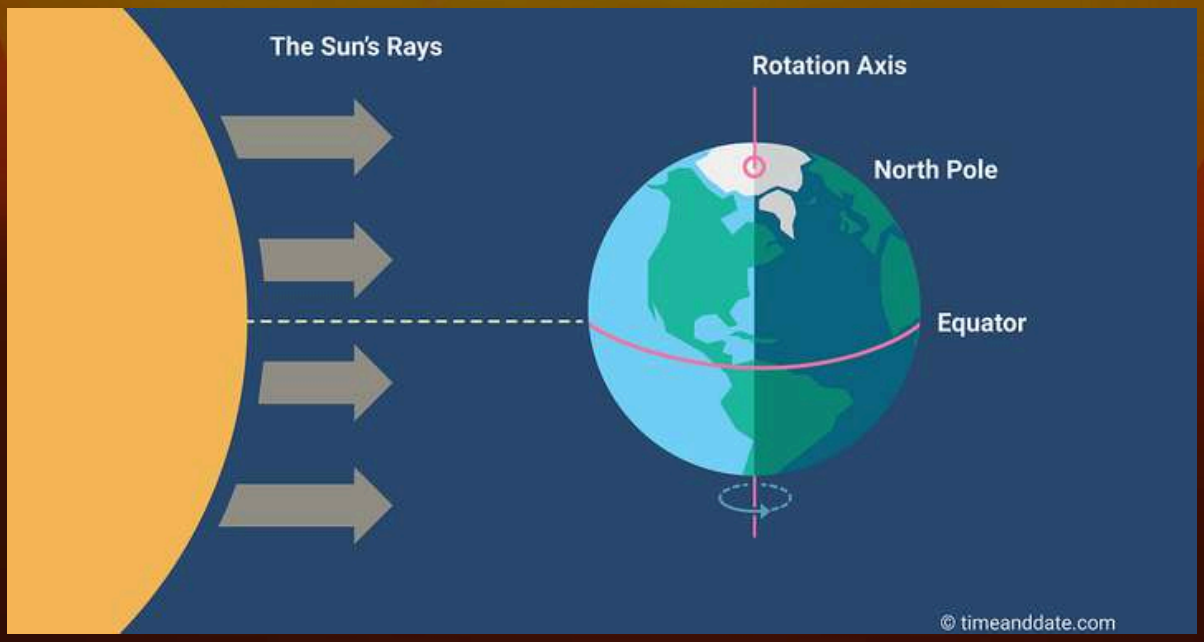
On March 20, the equinox, which occuring on 2026, marks one of the most significant turning points in Earth's annual journey around the Sun. On this day, the Sun crosses the celestial equator, creating nearly equal lengths of day and night for every place on Earth.

This balance happens because sunlight falls almost evenly on both hemispheres, a moment of symmetry that occurs only twice a year. The March Equinox signals the start of spring in the Northern Hemisphere, bringing longer days, warmer temperatures, and new growth, while the Southern Hemisphere transitions into autumn, with days gradually shortening.

## What is Equinox?

The equinox is the moment when the Sun crosses the celestial equator, causing day and night to become nearly equal across the Earth. This happens because Earth's 23.5° axial tilt leans neither toward nor away from the Sun, allowing sunlight to fall almost evenly on both hemispheres.

Although the equinox is not a dramatic visual event, we can observe its effects: the Sun rises exactly in the east and sets exactly in the west, and its path across the sky has a balanced height. At local noon, the Sun's angle is 90° minus your latitude – for example, around 80° high in the sky for places near 10°N. These subtle but measurable changes mark the shift into spring in the Northern Hemisphere and autumn in the Southern Hemisphere, making the equinox an important marker of Earth's orbital rhythm.




Although the equinox is not a visually observable event, its effects can be felt in the changing quality of light and the shift in seasons. It is a meaningful astronomical moment that beautifully illustrates Earth's axial tilt, orbital motion, and the rhythmic cycles that shape life across the planet.

# CONJUNCTIONS FOR THE MONTH

## Conjunction of Venus and Saturn

On March 8, Venus and Saturn will appear close together in the early evening sky, forming a striking conjunction low above the western horizon. The best viewing time will be 6:30–7:30 PM IST, shortly after sunset. Venus will shine brightly at a magnitude of −3.88, while Saturn will appear dimmer at 0.99, creating a beautiful planetary pairing visible to the naked eye.

Place: New Delhi / Date: 8th March / Time: 07:00 p.m.

## Conjunction of Mars and Mercury

Place: New Delhi / Date: 16th March / Time: 06:00 a.m.

On March 16, Mars and Mercury will come together in a compact conjunction low in the eastern sky just before sunrise, creating an interesting planetary pairing. Mars will shine at a magnitude of 1.18, while Mercury will appear slightly dimmer at 2.16. Mercury may be difficult to spot in the brightening dawn, but binoculars will help reveal the pair as two close points of light.

## Conjunction of Moon and Jupiter

On March 26, 2026, the Moon and Jupiter will appear close together in the evening sky shortly after sunset. The pair will be visible toward the western horizon, creating a bright and eye-catching sight. The Moon will shine at a magnitude of −12.16, while Jupiter will appear at −2.11, making them easy to spot with the naked eye.

Place: New Delhi / Date: 26th March / Time: 12:30 a.m.

## Conjunction of Moon, Uranus and Pleiades

Place: New Delhi / Date: 23th March / Time: 07.30 p.m.

On March 23, the Moon will pass near the Pleiades and the planet Uranus in the evening sky. Look toward the east-northeast after sunset, with the best viewing between 7:00 and 9:00 PM IST. The Moon will shine at −11.26 magnitude, while Uranus and the Pleiades will appear at 5.77 and 1.59 respectively. The Pleiades may look like a tiny misty patch to the naked eye, but binoculars will reveal many sparkling stars near the Moon.

# ASK THE UNIVERSE

## What happens to the the left over fuel in rockets when they are in space? (Question from Shubhang Bhargava, 7Grade)

When rockets reach space, leftover fuel is carefully managed. It is often used for final orbital adjustments, satellite positioning, or controlled re-entry burns. Space agencies like NASA and ISRO plan fuel usage precisely to avoid waste. If a rocket stage is returning to Earth, remaining fuel helps guide it safely into the ocean. In some cases, extra fuel is vented into space in a process called passivation to prevent explosions and reduce space debris. For deep-space missions, leftover fuel is reserved for future course corrections, ensuring spacecraft stay accurately on their intended path.

## Why are gravitational waves in the shape of waves? (Question from Arneet Singh Bohra, 7Grade)

Gravitational waves are called "waves" because they move outward like ripples. But unlike water waves or sound waves, they do not need a medium like air or water to travel.
Sound needs air. Water waves need water.
Gravitational waves are different they are ripples in space itself.
According to Albert Einstein's theory of relativity, space and time together form "spacetime." When massive objects like black holes collide, they shake spacetime. This shaking spreads outward in a repeating stretch-and-squeeze pattern, forming a wave.These ripples were first directly detected by LIGO.
So gravitational waves don't travel through space they are waves of spacetime itself.

## What is the most common type of planet discovered beyond our solar system among the 6,000+ found so far? (Question from Ronit Manocha, 6 Grade)

Among the 6,000+ confirmed exoplanets, the most common types are super-Earths and mini-Neptunes. These planets are larger than Earth but smaller than Neptune and fill the size gap between rocky planets and gas giants. Many orbit very close to their stars, making them easier to detect. Missions like Kepler Space Telescope have shown that such planets dominate the known population. In contrast, Earth-sized rocky worlds are less common in current data. Discoveries also include hot Jupiters, rogue planets, and planets orbiting two stars, highlighting the incredible diversity of planetary systems in our galaxy.

# ASK THE UNIVERSE

**1. How do astronomers record sound from space if sound cannot travel without a medium?**

Sound needs a medium such as air, water, or solid material to travel. Since space is mostly a vacuum, sound waves cannot propagate directly between celestial objects and Earth. Astronomers therefore do not record sound in the traditional sense. Instead, they detect electromagnetic waves, radio signals, or vibrations in plasma produced by objects such as planets, stars, and nebulae. Instruments on spacecraft measure these signals as variations in frequency, pressure, or magnetic fields. Scientists then convert these data into audible frequencies using a process called sonification. For example, plasma waves around planets like Jupiter or Saturn can be translated into sound for analysis. This technique allows researchers to study phenomena such as solar storms, magnetospheres, and cosmic radiation. The "sounds of space" we hear in recordings are therefore not actual sound traveling through space but scientific translations of electromagnetic or plasma data into sound frequencies that humans can hear.

**2. What makes the center of a black hole behave against normal physics?**

At the center of a black hole lies a point called the singularity, where matter is believed to collapse into an extremely tiny region with enormous density. According to Einstein's General Theory of Relativity, gravity becomes infinitely strong at this point, and spacetime is curved to an extreme level. Because of this extreme curvature, the physical laws that normally describe matter and energy stop working properly. Quantities such as density and gravitational force theoretically become infinite, which standard physics cannot fully explain. The problem arises because two major theories of physics—general relativity (which describes gravity and large cosmic structures) and quantum mechanics (which explains particles at very small scales)—do not yet work together under such extreme conditions. Scientists believe that a future theory called quantum gravity may explain what truly happens inside a singularity. Until then, the singularity appears to behave "against" normal physics because our current models break down under such extreme gravitational conditions.

**3. Why is the unknown energy of space called dark energy?**

Astronomers discovered in the late 1990s that the expansion of the universe is accelerating, meaning galaxies are moving away from each other faster over time. This unexpected behavior suggests that some form of energy is pushing space itself outward. Because scientists do not yet know what this energy is or how it works, it is called dark energy. The word "dark" does not mean it is literally black or invisible like dark matter; instead, it indicates that the nature of this energy is unknown and difficult to detect directly. Dark energy does not emit light, absorb light, or interact with matter in ways that telescopes can easily observe. However, its effects are visible through large-scale cosmic measurements, such as the movement of distant galaxies and observations of supernova explosions. Current models estimate that dark energy makes up about 68–70% of the universe, influencing the large-scale expansion of space.

**4. Why is Venus hotter than Mercury even though Mercury is closer to the Sun?**

The main reason is Venus's extremely thick atmosphere. Venus is surrounded by a dense layer of carbon dioxide and clouds of sulfuric acid. This atmosphere creates an intense greenhouse effect, trapping heat from the Sun and preventing it from escaping back into space. As a result, the surface temperature of Venus can reach about 465°C, which is hot enough to melt lead. Mercury, on the other hand, has almost no atmosphere. Without an atmosphere to trap heat, the planet cannot hold warmth after sunset. This causes extreme temperature changes: Mercury can reach about 430°C during the day, but drop to −180°C at night. Because Venus continuously traps heat in its atmosphere, its temperature stays extremely high all the time, making it the hottest planet in the solar system despite being farther from the Sun.

**(All the four questions are from Vidyashri, 10 Grade)**

# STORIES OF INDIA'S GREATEST MINDS

## Dr. A.P.J. Abdul Kalam

### A Man of Vision and Values

Who was Dr. Abdul Kalam?

A. P. J. Abdul Kalam was one of India's most admired scientists and the 11th President of India. Born in Rameswaram, Tamil Nadu, he grew up in a humble family and worked hard to pursue his education. Through dedication and perseverance, he rose to become one of the leading figures in India's scientific and technological development. Because of his pioneering work in missile technology, he was widely known as the "Missile Man of India."

Why is he important to India's space journey?

Dr. Kalam played a major role in strengthening India's space and defense capabilities. During his work with Indian Space Research Organisation and later in India's defense programs, he helped develop technologies that allowed the country to become more self-reliant in rocket and missile systems. His efforts contributed significantly to India's growing confidence in space exploration and advanced scientific research.

What did he achieve?

One of his major achievements was leading the development of SLV-III, which successfully placed the Rohini Satellite into orbit in 1980. This historic mission proved that India could build and launch its own satellites.

Dr. Kalam also played a key role in India's missile development programs, including the Agni and Prithvi systems. His scientific leadership strengthened India's defense technology and brought great pride to the nation.

How did he inspire millions?

Beyond his scientific achievements, Dr. Kalam was deeply passionate about education and young minds. He spent much of his time visiting schools and colleges, interacting with students, and encouraging them to dream big.

His famous message continues to inspire generations:

"Dream, dream, dream. Dreams transform into thoughts and thoughts result in action."

What is his lasting legacy?

Dr. Abdul Kalam's life showed that determination, humility, and hard work can overcome any obstacle. From a small-town boy to a world-respected scientist and President, his journey remains one of India's most inspiring success stories.

Today, he is remembered not only for his contributions to science and technology but also for his simplicity, kindness, and unwavering belief in the power of youth. His work helped shape India's modern scientific progress, and his words continue to encourage young people to explore, innovate, and build a better future.

# HISTORICAL EVENTS OF MARCH

## Venera 3 Impacts Venus

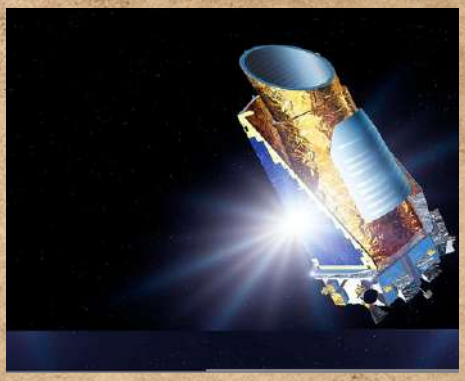
On March 1, 1966, the Soviet spacecraft Venera 3 became the first human-made object to reach another planet, impacting the surface of Venus. Launched in 1965, the probe carried instruments intended to study Venus's atmosphere and surface conditions. Although communication was lost before impact, the mission marked a historic milestone in interplanetary exploration. Venera 3 demonstrated the feasibility of sending spacecraft beyond Earth orbit, paving the way for future planetary missions and deepening humanity's reach into the Solar System. (image credits: vestidinrusia.com)

## Discovery of a Giant Gamma-Ray Burst

On March 5, 1979, a powerful gamma-ray burst was detected by multiple spacecraft, marking one of the most extraordinary cosmic events ever observed. Known as GRB 790305b, the burst originated from the supernova remnant N49 in the Large Magellanic Cloud. Its intensity and recurring pulsations distinguished it from typical gamma-ray bursts. Later research identified the source as a magnetar flare, the first of its kind recorded, reshaping understanding of high-energy astrophysical phenomena. (image credits: sci.news)

## Kepler Space Telescope Launch

On March 6, 2009, NASA launched the Kepler Space Telescope, initiating a mission dedicated to discovering planets beyond our Solar System. Positioned in an Earth-trailing orbit, Kepler used a highly sensitive photometer to monitor the brightness of over 150,000 stars, searching for the tiny dips caused by transiting exoplanets. The mission revolutionized astronomy, identifying thousands of candidate worlds, including Earth-like planets in habitable zones, and profoundly expanding humanity's understanding of planetary systems across the galaxy.
(image credits: ar.inspiredpencil.com)



SIDEREVS
NVNCIVS
MAGNA, LONGEQVE ADMIRABILIA
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PHILOSOPHIS, atq; ASTRONOMIS, quæ à
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## Galileo Publishes Sidereus Nuncius

On March 13, 1610, Galileo Galilei published Sidereus Nuncius ("Starry Messenger"), a groundbreaking work that transformed astronomy. Based on observations through his improved telescope, Galileo described mountains and craters on the Moon, countless stars invisible to the naked eye, and the four largest moons of Jupiter. This publication challenged traditional cosmology, providing direct evidence that celestial bodies were not perfect spheres. Sidereus Nuncius marked a turning point in scientific history, advancing the Copernican view of a dynamic universe. (image credits: openlibrary.org)

# HISTORICAL EVENTS OF MARCH

## Discovery of Uranus

On March 13, 1781, astronomer William Herschel discovered Uranus while observing the night sky with his telescope in Bath, England. Initially thought to be a star or comet, its slow orbital motion revealed it as a new planet, the first identified since antiquity. This breakthrough expanded the known boundaries of the Solar System and marked a turning point in astronomy. Uranus's discovery demonstrated the power of telescopic observation and reshaped humanity's understanding of the planetary order.
(image credits: science.nasa.gov).

## First Liquid-Fueled Rocket Launch

On March 16, 1926, American physicist Robert H. Goddard successfully launched the world's first liquid-fueled rocket in Auburn, Massachusetts. The small vehicle, powered by liquid oxygen and gasoline, flew for about 2.5 seconds, reaching an altitude of 12.5 meters and landing 56 meters away. Though modest in scale, this pioneering experiment demonstrated the practicality of liquid propulsion. Goddard's achievement laid the foundation for modern rocketry, ultimately enabling space exploration and transforming the future of aerospace engineering. (image credits: spaceref.com).

## First Spacewalk

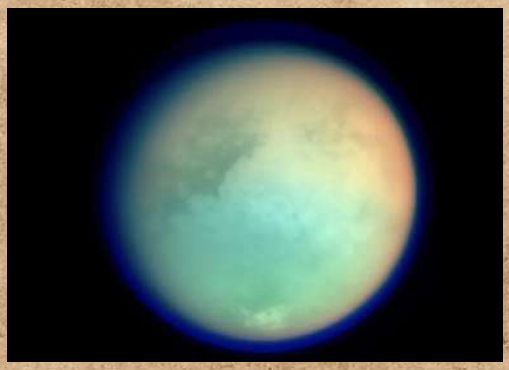
On March 18, 1965, Soviet cosmonaut Alexei Leonov conducted the world's first extravehicular activity (EVA), stepping outside the spacecraft Voskhod 2 for 12 minutes. Connected by a tether, Leonov floated in space, capturing humanity's first direct experience beyond a vehicle. The mission faced challenges, including his spacesuit inflating and difficulty re-entering the airlock. Despite these risks, the achievement marked a historic milestone, proving astronauts could survive and work in the vacuum of space. (image credits: space.com).


## Discovery of Comet Shoemaker-Levy 9

On March 24, 1993, astronomers Carolyn and Eugene Shoemaker, along with David Levy, discovered Comet Shoemaker–Levy 9 using the Palomar Observatory's Schmidt telescope. The comet was found in orbit around Jupiter, an unusual circumstance caused by the planet's strong gravity. Its fragmented appearance revealed that it had been torn apart during a previous close encounter. This discovery set the stage for the dramatic 1994 collision with Jupiter, offering unprecedented insights into planetary impacts and celestial dynamics. (image credits: americaspace.com).

# HISTORICAL EVENTS OF MARCH

## Discovery of Titan

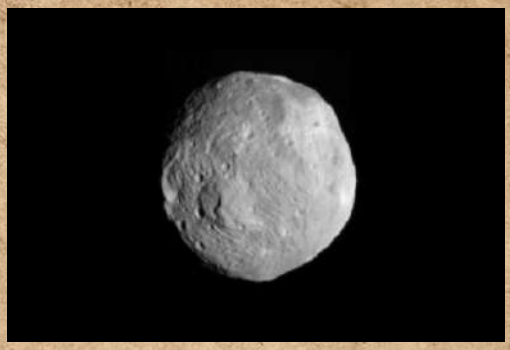


On March 25, 1655, Dutch astronomer Christiaan Huygens discovered Titan, Saturn's largest moon, using a telescope of his own design. Observing from The Hague, Huygens identified Titan as a distinct celestial body orbiting Saturn, making it the first moon of the planet ever recorded. Titan's discovery expanded knowledge of the Solar System and highlighted the power of improved optics in astronomy. Today, Titan is recognized as a complex world with thick atmosphere and surface features reminiscent of Earth. (image credits: thedebrief.org).

## Death of Yuri Gagarin

On March 27, 1968, Soviet cosmonaut Yuri Gagarin, the first human to journey into space, tragically died in a jet crash near Kirzhach, Russia. Gagarin and flight instructor Vladimir Seryogin were piloting a MiG-15UTI when the accident occurred during a routine training flight. His death shocked the world, ending the life of a pioneering figure in space exploration. Gagarin remains celebrated as a hero whose historic 1961 mission opened humanity's path to the cosmos. (image credits: nationalgeographic.com).

## Discovery of Pallas



On March 28, 1802, German astronomer Heinrich Wilhelm Olbers discovered Pallas, the second asteroid identified in the Solar System. Observing from Bremen, Olbers detected the object near the orbit of Ceres, which had been found just a year earlier. Pallas, one of the largest asteroids in the main belt, revealed that the region between Mars and Jupiter contained multiple small planetary bodies. Its discovery advanced the study of minor planets and deepened understanding of the Solar System's structure. (image credits: ecured.cu).

## Luna 10 Orbits the Moon

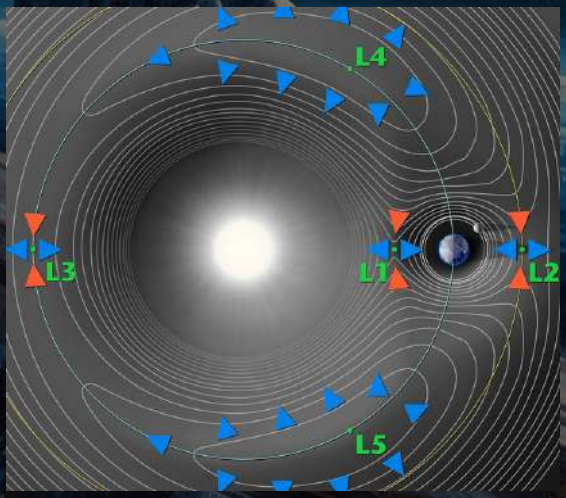
On March 31, 1966, the Soviet spacecraft Luna 10 became the first artificial satellite to orbit the Moon. Launched as part of the Luna program, the probe entered lunar orbit and transmitted scientific data back to Earth. Its instruments measured lunar gravity variations, surface composition, and radiation levels, providing valuable insights into the Moon's environment. Luna 10 marked a historic milestone in space exploration, demonstrating the feasibility of sustained orbital studies beyond Earth. (image credits: alchetron.com).

# ASTRONOMY & SPACE TERM

## ROCHE LIMIT

The Roche Limit is the minimum distance at which a celestial body can orbit a larger body without being torn apart by tidal forces. When a smaller object, such as a moon or comet, comes too close to a massive planet, the planet's gravitational pull on the near side becomes significantly stronger than on the far side. If this difference in gravitational force exceeds the smaller body's own gravitational cohesion, it disintegrates. The concept was first described by the French astronomer Édouard Roche in the 19th century. The Roche Limit depends on the densities of both objects and whether the smaller body is rigid or fluid. A well-known example is the ring system of Saturn, which lies within its Roche Limit, where fragmented material cannot coalesce into a moon.

## HILL SPHERE

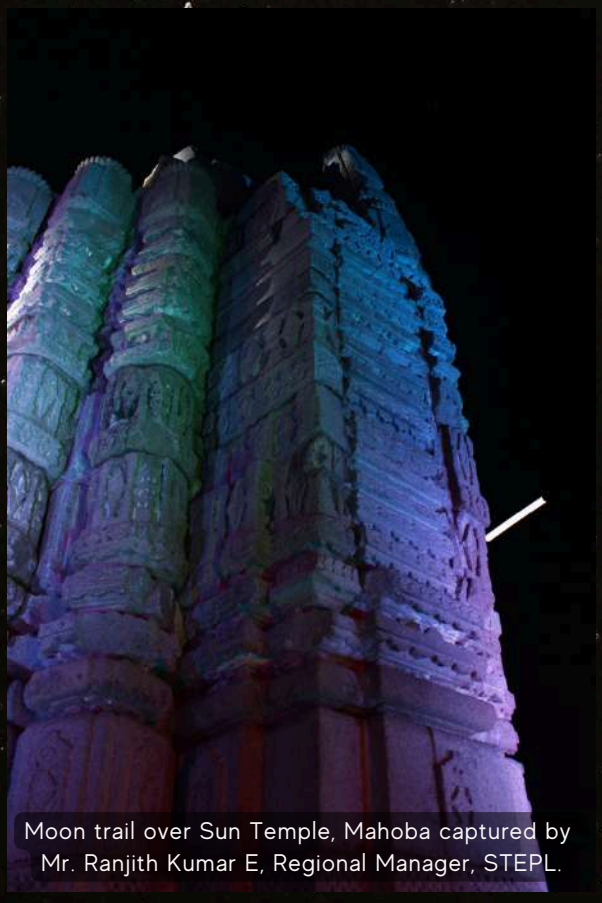



The Hill Sphere is the region around an astronomical body where its gravitational influence dominates over that of a more massive body it orbits. Within this region, smaller objects such as moons or satellites can remain gravitationally bound to the planet rather than being pulled away by the star. The size of the Hill Sphere depends on the mass of the planet, the mass of the star, and the distance between them. For example, Earth retains its Moon within its Hill Sphere despite the much stronger gravity of the Sun.

This concept is essential in understanding satellite stability, planetary ring systems, and the formation of moons in both our solar system and exoplanetary systems.

# ASTROPHOTOGRAPHY BY SPACE TEAM

Western Star trail over Sun Temple, Mahoba captured by Mr. Ravi Kumar, Senior Educator, SPACE

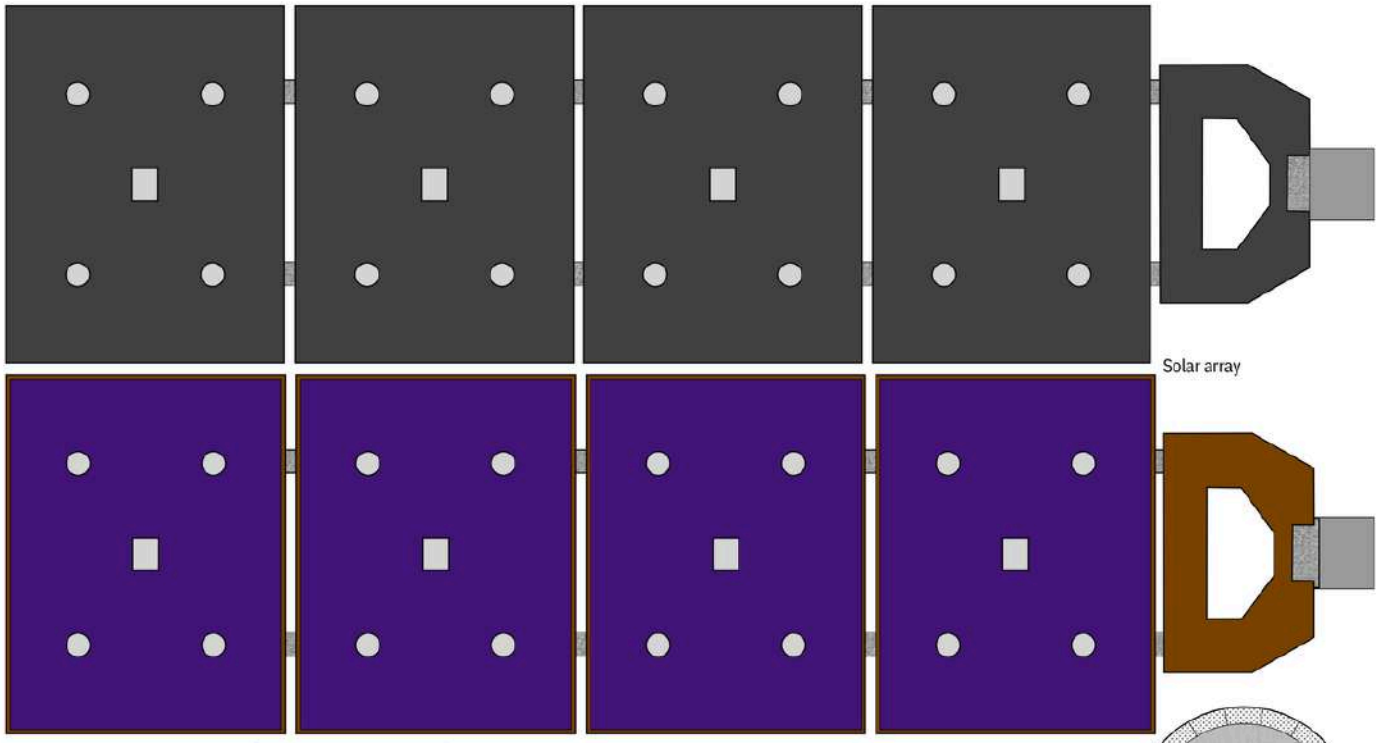


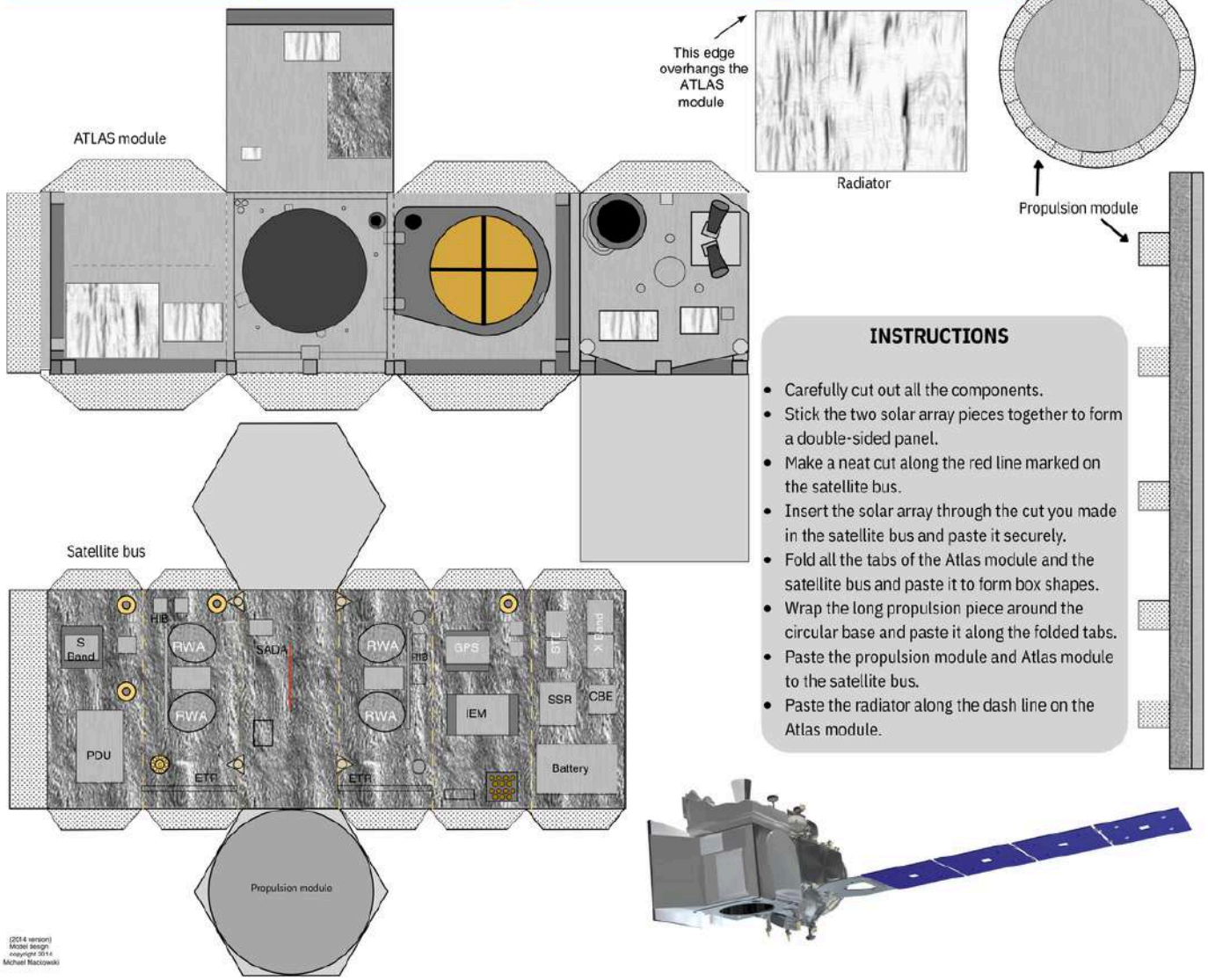
Moon trail over Sun Temple, Mahoba captured by Mr. Ranjith Kumar E, Regional Manager, STEPL.

Star trail over Sun Temple, Mahoba captured by Mr. Ranjith Kumar E, Regional Manager, STEPL.

# COSMIC JOURNEY- THE NIGHT AND DAY

# MISSION: DO IT YOURSELF



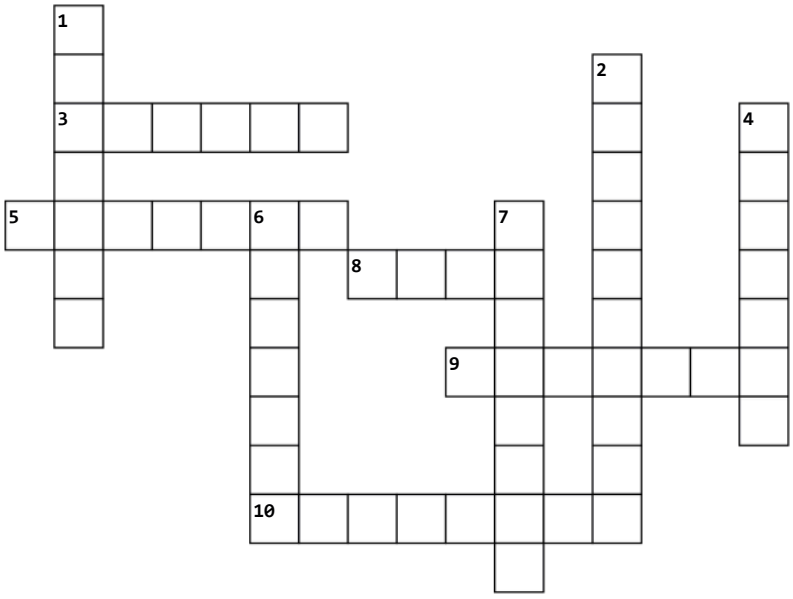




## INSTRUCTIONS

- Carefully cut out all the components.
- Stick the two solar array pieces together to form a double-sided panel.
- Make a neat cut along the red line marked on the satellite bus.
- Insert the solar array through the cut you made in the satellite bus and paste it securely.
- Fold all the tabs of the Atlas module and the satellite bus and paste it to form box shapes.
- Wrap the long propulsion piece around the circular base and paste it along the folded tabs.
- Paste the propulsion module and Atlas module to the satellite bus.
- Paste the radiator along the dash line on the Atlas module.

# TRAIN YOUR BRAIN

## CROSSWORD



### Across

3. Which Russian space agency astronaut is flying on Crew-12?
5. Who is the Commander of Artemis II?
8. In which state was Sunita Williams born?
9. What natural phenomenon became visible at the polar regions during the solar storm?
10. In which constellation Mercury was located during the greatest eastern elongation event on February?

### Down

1. What becomes infinitely strong at singularity?
2. Which powerful cosmic objects are fueled by accretion?
4. Which planet gave Ulysses its gravity assist in 1992?
6. What is the name of the main surveillance satellite onboard PSLV-C62 developed by DRDO?
7. What was the name of the first Space Shuttle ever built and flown?

## Astronomy Word Puzzle

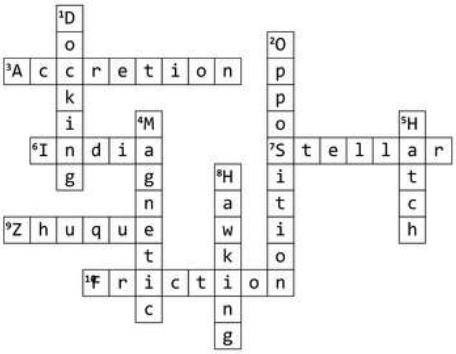
### Galaxies

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | T | D | P | D | W | H | I | R | L | P | O | O | L |
| W | R | H | A | I | S | L | L | N | N | E | O | D | E |
| P | A | W | D | U | N | C | P | E | O | C | L | A | R |
| A | E | H | I | O | A | W | U | H | R | O | L | C | E |
| R | A | R | A | G | I | C | H | L | I | K | E | D | P |
| O | M | S | E | W | M | E | N | E | P | I | W | R | P |
| B | N | I | P | L | I | I | L | L | E | T | O | D | O |
| H | E | E | R | T | L | G | L | O | P | L | O | H | H |
| S | O | M | B | R | E | R | O | K | P | E | E | R | S |
| N | W | R | R | L | O | H | W | O | Y | D | T | I | S |
| A | L | I | N | E | E | D | L | E | D | W | A | P | A |
| E | C | A | R | T | W | H | E | E | L | N | A | T | R |
| A | R | A | N | D | R | O | M | E | D | A | C | Y | G |
| A | N | T | E | N | N | A | E | R | K | D | L | A | E |

WHIRLPOOL
NEEDLE
ANDROMEDA
TADPOLE
SCULPTOR
SOMBRERO
CARTWHEEL
CIGAR
GRASSHOPPER
ANTENNAE
PINWHEEL
MILKYWAY

**Answers for this month puzzles will be shared in next magazine.

### Answers for last month puzzles.



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