SPACE™
EMPOWERING LIFE

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Galactica

Astronomy and Space Science Magazine

What's Inside?
SPACE Insights
Highlights From December 2025
Moon Phases And Planet Visibility
What's Awaiting in January 2026
Space Paradoxes
Setbacks That Built Space Success
Stories of India's Greatest Minds
Historical Events Happened In January
Mission: Do It Yourself
Student's Corner
Astronomy & Space Term
January Born Legends
Train Your Brain

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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.

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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.

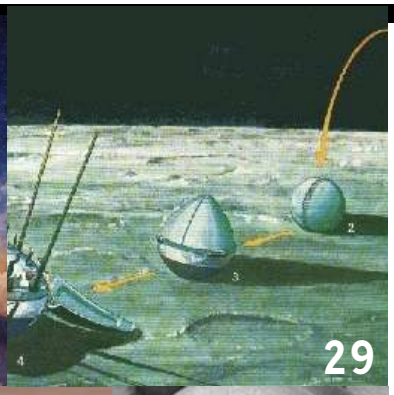
Co-founder's Message

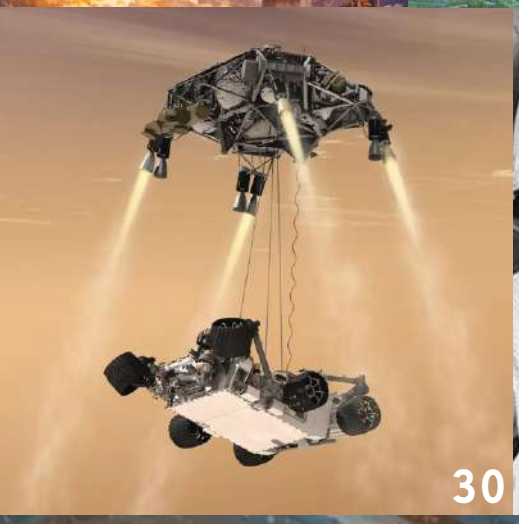
Ms. Shalini Bahmba, Co-founder, SPACE

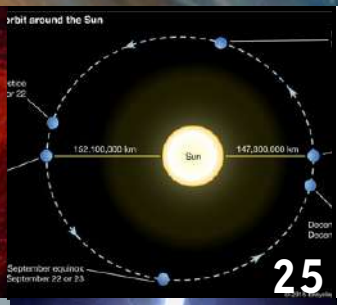
Astronomy education is important as it builds curiosity, critical thinking, and problem-solving skills, helping young minds prepare for the future. It encourages innovation, exploration, and a scientific mindset. Young learners build creativity and confidence through hands-on, experiential learning,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

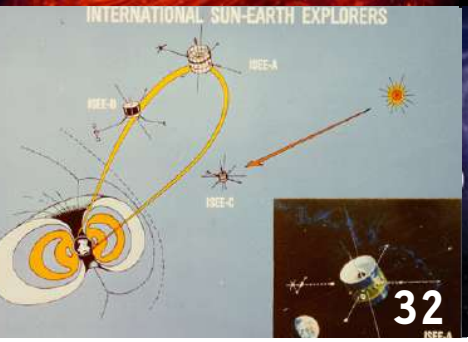
LIST OF

CONTENTS

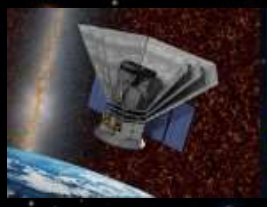




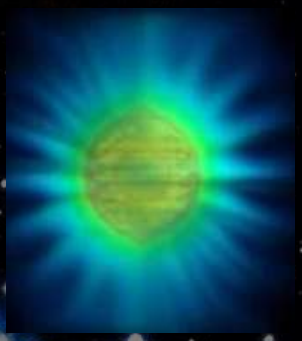




Glimpses of 2025





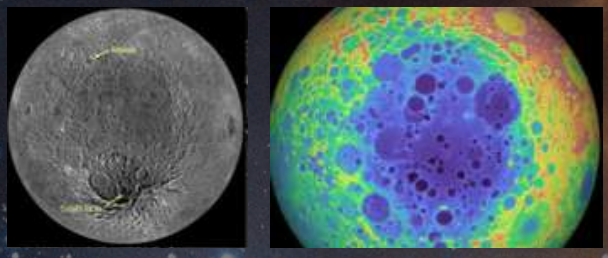





- Artificial Solar Eclipse in Space: ESA's Proba-3, launched aboard PSLV-XL, achieved precision formation flying to create an artificial solar eclipse–unlocking new secrets of the Sun's corona.
- A Photon Finally Takes Shape: Scientists captured the first-ever visualisation of a single photon, turning a quantum mystery into something we can finally "see."
- The Moon Is Still Alive: Fresh evidence of moonquakes and surface wrinkles suggests our Moon may still be geologically active today.
- Decoding the Sun's Influence: NASA's PUNCH mission began its quest to study the Sun's corona and solar wind, reshaping our understanding of space weather.
- 286 Days in Orbit: NASA astronauts returned safely after an extended 286-day space mission, pushing the limits of human endurance in space.
- A Star on the Verge of Explosion: Astronomers closely tracked T Coronae Borealis, a rare recurrent nova expected to erupt and possibly shine bright to the naked eye.
- A Blood-Red Moon Show: A stunning total lunar eclipse painted the Moon deep red, mesmerizing skywatchers across the globe.
- A Cosmic Visitor from the Deep: Comet C/2025 R2 (SWAN) lit up the skies as it journeyed from the outer solar system, thrilling astronomers worldwide.
- From Beyond Our Solar System: The discovery of Interstellar Comet 3I/ATLAS offered a rare glimpse into material formed around another star.
- Space Programs on Pause: A U.S. funding lapse temporarily disrupted NASA missions, research, and global collaborations–highlighting the fragility of space exploration.

Glimpses of 2025

- SPHEREx Opens a New Cosmic Window: NASA's SPHEREx telescope captured its first-light images, beginning an ambitious infrared map of the entire universe.
- Artemis Unlocks the Moon's Ancient Secrets: Artemis missions set sights on the South Pole-Aitken Basin, probing clues of the Moon's molten past and early evolution.
- Tianwen-2 Begins a Double Adventure: China's Tianwen-2 launched to collect samples from asteroid 2016 HO3 and later study a distant comet–pushing deep-space exploration forward.
- India Returns to Human Spaceflight: With Axiom-4, India proudly returned to crewed spaceflight as astronaut Shubhanshu Shukla reached the International Space Station.
- A Visitor from Beyond the Stars: Astronomers confirmed 3I/ATLAS, the third known interstellar object, carrying pristine material from another star system.
- NISAR Takes Charge of Earth Watch: The joint ISRO-NASA NISAR satellite launched to track Earth's surface changes, climate shifts, and natural hazards with unmatched precision.
- Artemis II Crew Trains for the Moon: NASA's Artemis II astronauts completed critical simulations, gearing up for humanity's first crewed lunar mission in decades.
- Webb Finds a New Moon at Uranus: The James Webb Space Telescope discovered a faint new moon around Uranus, deepening our understanding of its mysterious satellite system.



SPACE INSIGHTS

Bringing Space to the Community: Inspiring Curiosity Through Collaborative Outreach

Two impactful Community Engagement Programmes conducted at Victoria School CBSE, Thoothukudi, and Casagrand International School – Arisers Campus, Perumbakkam, showcased the power of experiential learning in astronomy and space science. Both initiatives emphasized scientific curiosity, hands-on exploration, and meaningful community involvement, highlighting how outreach beyond classrooms can inspire learners of all ages.

At Victoria School CBSE, the programme engaged nearly 200 students along with teachers from Caldwell Higher Secondary School through interactive sessions on telescope types, safe solar observation, and an immersive virtual reality spacewalk around the International Space Station. Supported by enthusiastic Grade 11 student volunteers, the event created a vibrant learning environment that brought astronomical concepts to life.

Similarly, the outreach programme at New Hope & New Life Orphanage, organized by Casagrand International School in collaboration with SPACE India, focused on younger learners while fostering empathy and leadership. Guided by Grade VIII student facilitators, participants explored science through activity stations such as pop rockets, light experiments, DSLR imaging, telescope awareness, and safe solar observation, blending scientific learning with social responsibility.

Together, these programmes reflect a shared commitment to inclusive science education. By reaching diverse communities and engaging students as both learners and leaders, both schools demonstrated how space outreach can inspire curiosity, compassion, and a lasting connection with science—making each initiative equally significant and impactful.

From Learning to Launch: Universe in the School at Winter Carnival 2025

During the Winter Carnival held on 27th and 28th December, a series of engaging astronomy activities were successfully organized to spark curiosity and interest in astronomy and space science among students, parents, and teachers. The event featured a wide range of interactive, hands-on experiences that captivated participants of all age groups.

One of the major attractions was Planetary Pop Art, where participants creatively crafted planets using colorful techniques inspired by their compositions and features, seamlessly blending science with imagination. The Air Rocketry activity added excitement as participants designed and launched air-powered rockets, helping them understand the fundamentals of aerodynamics and propulsion.

A special highlight was the showcase of the Moon Rover, along with insights into the Pragyan Rover and Vikram Lander of the Chandrayaan-3 mission, which introduced visitors to India's historic lunar achievement and its scientific goals, instilling pride and enthusiasm for space exploration.

The Planetarium Show offered a guided journey through the universe, explaining celestial phenomena, planetary motion, constellations, and deep-space objects through visually rich presentations. Additionally, the AR/VR Zone allowed participants to experience immersive virtual spacewalks and 3D views of the solar system, making complex concepts both accessible and exciting.

The carnival also featured telescope observations of the Sun, Moon, and visible planets under expert guidance, providing attendees with real-time astronomical viewing using safe observation methods.

Overall, the astronomy activities at the Winter Carnival were a great success, combining fun, creativity, and scientific learning. Student volunteers played a key role in guiding parents and visitors, fostering curiosity, innovation, and a deeper appreciation for space science across the community.

A Window to the Universe: Two-Day Planetarium Experience at DPS Greater Faridabad

A two-day Planetarium Experience was organised to provide students from Grades I to IX with an immersive and enriching exposure to space science. The initiative aimed to supplement classroom teaching with experiential learning by enabling students to explore astronomical concepts through a dome shaped mobile planetarium set up on the school premises.

The planetarium created a realistic simulation of the night sky and deep space phenomena, allowing students to visualise celestial movements and cosmic structures in an engaging and interactive environment. The sessions were carefully planned and scheduled over two days to ensure systematic participation across all grade levels.

Age-appropriate shows were curated to meet the learning needs of different student groups. Junior students were introduced to basic space concepts through Puppy on the Moon, which used storytelling and visual elements to explain fundamental ideas related to the Moon and space exploration. Middle and senior grade students viewed Back to the Moon and Deep Sky Objects, which provided deeper insights into lunar missions, space exploration, galaxies, nebulae, and other distant celestial formations.

Across both days, students displayed a high level of curiosity and engagement, actively participating through observations, questions, and discussions. The immersive visual experience enabled students to better understand abstract and complex scientific concepts, thereby strengthening conceptual clarity beyond traditional classroom learning.

The two-day planetarium experience successfully fostered scientific curiosity, critical thinking, and a sense of wonder about the universe. The event reinforced the importance of experiential learning and contributed meaningfully to the holistic development of students by encouraging inquiry based and visual learning approaches.

Under the Sun, Beyond the Planets: A Stellar Helio Event at K. R. Mangalam World School

A "Stellar Helio Event" was successfully organized in the school through the collaborative efforts of the Astronomy Educator and students on December 20, 2025. The event focused on solar observation and an engaging display on the rings of planets, offering participants a unique opportunity to explore fascinating astronomical concepts.

The event witnessed enthusiastic participation and keen interest from parents as well as the entire faculty, who actively observed and appreciated the demonstrations. The interactive setup created a stimulating learning environment, making astronomy accessible and enjoyable for all age groups. The activities not only enhanced scientific curiosity but also served as an enriching educational experience beyond the classroom.
The event was thoughtfully designed to be informative, interactive, and visually engaging. Live solar observation allowed attendees to understand solar features, while the planetary rings exhibit sparked curiosity and discussion among the observers. Overall, the event successfully promoted scientific awareness and fostered a deeper appreciation for space science within the school community.

The event was conducted in a lively and well coordinated manner. Solar observation sessions were the highlight of the program, where parents and students observed the Sun using safe solar viewing equipment. The experience left the observers truly amazed, as many witnessed solar features for the first time. Their excitement was evident through active participation, curiosity, and thoughtful questions during the session.
In addition to the observations, students enthusiastically took part in the "Ring the Planet" activity, which brought joy and hands-on learning to the event. This interactive game helped students better understand planetary structures while keeping the atmosphere fun and engaging. Overall, the blend of scientific observation and creative activities made the event a memorable and enriching

Exploring the Universe Together: Astronomy Showcase at Victoria School, Thoothukudi

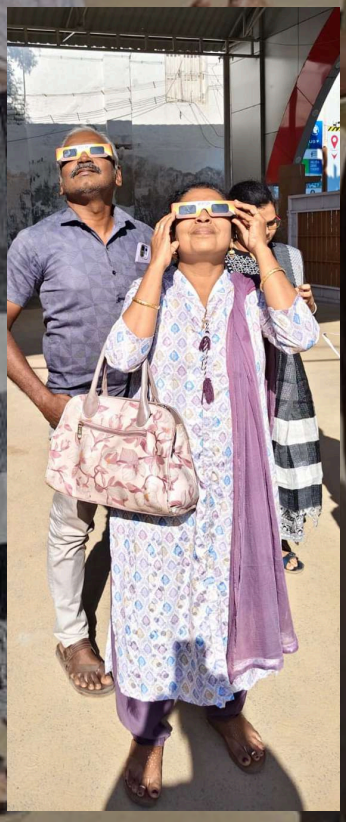
Astronomy Showcase at Victoria School, Thoothukudi transformed the campus into a hub of cosmic curiosity. Held after the Parent Teacher Meeting, the event offered parents and students a unique opportunity to explore the wonders of space science together in an interactive and engaging setting.

At the heart of the showcase were the enthusiastic Grade 11 student volunteers, who confidently took on the role of young science communicators. Guiding participants through various activities, they explained astronomical concepts with clarity and enthusiasm, demonstrating strong leadership, teamwork, and communication skills.

The showcase featured a rich blend of presentations and hands on experiences. Students introduced participants to topics such as the types of telescopes, the science of light, and the phases of the Moon, simplifying complex ideas for easy understanding. Interactive activities including safe solar observation, ring the planets, and pop rocket experiments added excitement and encouraged experiential learning.

One of the most memorable moments of the event was the Virtual Reality Space Walk, which allowed parents and students to experience the sensation of floating around the International Space Station (ISS). This immersive activity offered a realistic glimpse into life beyond Earth and was met with great enthusiasm.

The Astronomy Showcase received overwhelmingly positive feedback from parents and teachers, who appreciated the school's efforts to enrich scientific knowledge and spark curiosity. By blending education with experience, the event successfully strengthened the bond between students and parents while inspiring a shared appreciation for astronomy and space exploration.



Observing the Sun Safely: A Solar Science Session at Delhi World Public School, Noida Extension

A Safe Solar observation session was successfully conducted at Delhi World Public School, Noida Extension to provide students with a safe and enriching experience of observing the Sun.

The Safe Solar Observation was organized on the school grounds and included participation from students of the entire school. A 76 mm reflector telescope, with a certified solar filter, was used for the observation to ensure complete safety.

During the session, students observed the Sun through the telescope and were able to clearly see sunspots on the solar surface. This led to engaging discussions about the Sun, its structure, sunspots, and other important solar features. Students learned how sunspots are related to solar magnetic activity and why they appear darker than the surrounding areas.

The solar observation was both educational and exciting, and students thoroughly enjoyed the rare opportunity to observe the Sun closely. The activity successfully sparked curiosity, enhanced scientific understanding, and created a memorable learning experience for all participants.

Evening Sky Observation Session at Delhi World Public School, Noida

An evening observation session was successfully conducted at Delhi World Public School, Noida Extension to provide students with an exciting and hands on experience of observing celestial and terrestrial objects.

The activity was organized on the school grounds and witnessed enthusiastic participation from students of Class 1 to Class 9. Different types of telescopes were used during the session, including a **55 mm refractor telescope**, a **76 mm reflector telescope**, and an **8 inch Dobsonian telescope**, allowing students to explore various objects safely and clearly.

During the evening session, **solar, lunar, and planetary observations** were conducted. Students of **Class 1 to Class 4** observed the **Sun and Saturn**, while students of **Class 5 to Class 9** observed the **Sun, Moon, and Saturn** through the telescopes.

In addition to celestial observations, students also observed **terrestrial objects** through the telescopes. They were taught how to **point and align the 55 mm refractor telescope** to observe terrestrial objects and learned the **basic working of a telescope**, including how it collects and focuses light.

Students were also introduced to a night sky simulation using the Stellarium software, where they learned to identify planets, stars, and constellations. This helped them better understand the night sky and connect real observations with digital sky maps.

Special emphasis was given to safety during solar observation. Students were explained the importance of using proper solar filters and following safe scientific practices

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The evening observation session was both educational and enjoyable. It enhanced students' understanding of astronomy, improved their observational skills, and created a memorable learning experience for all participants.

HIGHLIGHTS OF DECEMBER 2025

TINY LIGHTNING ON MARS: A DISCOVERY FROM THE RED PLANET

Lightning being discharged from a dust storm on the Red Planet. (Image credit: NASA)

For the first time, scientists have detected tiny lightning discharges on Mars, revealing an unexpected electrical side to the Red Planet's dusty environment. The discovery was made using an unlikely instrument aboard NASA's Perseverance rover: its microphone. These miniature lightning events were found near dust storms and swirling dust devils, offering fresh insight into Martian chemistry, climate, and the ongoing search for ancient life.

A team led by Baptiste Chide of the Institut de Recherche en Astrophysique et Planétologie analyzed 29 hours of microphone recordings spanning two Martian years. Within this data, they identified 55 distinct electrical discharge events. Each event produced a characteristic signal – not just sound, but electronic interference caused by magnetic fields generated during the discharge, followed by a faint shockwave. Unlike Earth's dramatic lightning bolts, Martian lightning is extremely small and localized, often occurring just meters from the rover.

Mars lacks thunderstorms because its thin atmosphere contains almost no water. Instead, Martian lightning is triggered by friction between dust particles, similar to static electricity generated by rubbing a balloon. Due to Mars' low atmospheric pressure, electrical discharges require far less energy than on Earth, making these subtle flashes possible within dust storms and devils.

This discovery solves a long-standing mystery: the origin of oxidants like hydrogen peroxide on Mars. Lightning-driven chemical reactions can both destroy and create organic molecules, directly affecting the preservation of potential biosignatures. This has major implications for astrobiology, suggesting that regions with fewer dust storms may be better targets for life-hunting missions.

Beyond science, the findings will help engineers design safer spacecraft and astronaut equipment for future missions. As researchers explore how widespread this phenomenon is, Mars may no longer seem like a silent desert – but a planet quietly crackling with electric energy.

INDIA'S LVM3 LAUNCHES RECORD BREAKING BLUEBIRD 6 SATELLITE

India achieved another major milestone in spaceflight with the successful launch of the BlueBird 6 satellite, a next-generation smartphone communications spacecraft built by Texas-based AST SpaceMobile. The satellite lifted off aboard India's most powerful rocket, the LVM3, from the Satish Dhawan Space Centre on the night of December 23, 2025, marking a significant step toward global space-based mobile connectivity.

The LVM3 rocket soared into the sky at 10:25 p.m. EST (8:55 a.m. IST on December 24), deploying BlueBird 6 into low Earth orbit approximately 15.5 minutes after launch. The satellite was released at an altitude of about 324 miles (521 kilometers), precisely as planned, highlighting the reliability and growing maturity of India's heavy-lift launch capabilities.

BlueBird 6 is a technological record-setter. It carries the largest communications array ever designed to unfold in low Earth orbit. Covering nearly 2,400 square feet (223 square meters), its massive antenna dwarfs those of its predecessors, which already held records at 693 square feet. This dramatic increase in size allows the satellite to deliver stronger and more efficient broadband signals directly to standard smartphones, without the need for specialized ground equipment. AST SpaceMobile is building a constellation of such satellites to provide seamless cellular coverage across the globe, including remote and underserved regions.

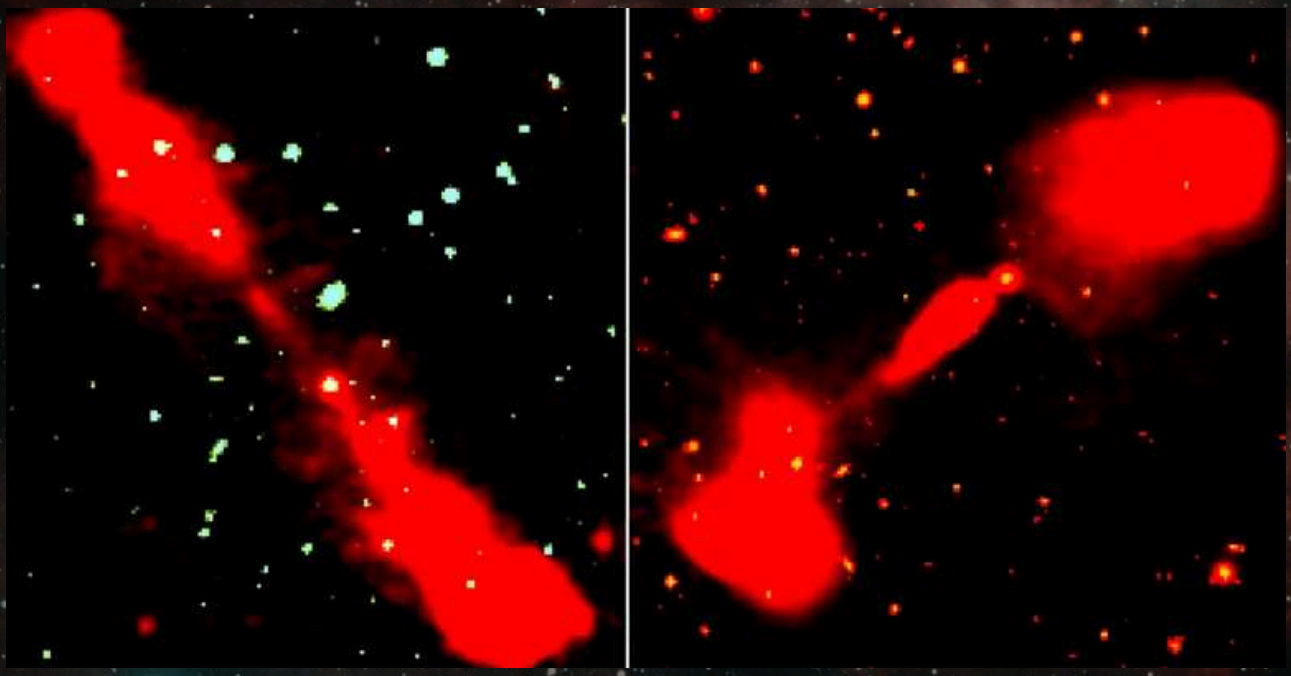
With BlueBird 6 now in orbit, the company has launched six operational satellites, moving closer to its vision of space-based mobile broadband.

For India, the mission represents the ninth successful flight of the 143-foot-tall, three-stage LVM3 rocket, which has maintained a perfect success record since its debut in 2014. The launch underscores India's growing role as a trusted partner for cutting-edge commercial space missions and its rising prominence in the global space economy.

INDIA'S GMRT REVEALS COSMIC GIANTS BEYOND IMAGINATION

Astronomers have uncovered a spectacular population of cosmic giants: 53 newly identified quasars launching colossal jets of matter that stretch up to 7.2 million light-years across – nearly 50 times wider than the Milky Way. These extraordinary objects belong to a rare class known as Giant Radio Quasars and represent some of the largest single structures powered by supermassive black holes ever observed.

The discovery was made by Indian astronomers using data from the Giant Meterwave Radio Telescope (GMRT) near Pune, as part of the TIFR GMRT Sky Survey (TGSS). By surveying nearly 90% of the sky at low radio frequencies, the team identified 369 radio quasars in total, including these 53 extreme giants whose immense size sets them apart. As researcher Souvik Manik noted, these radio jets are "not comparable to our solar system or even our galaxy," spanning the equivalent of 20 to 50 Milky Ways placed side by side.



Two newly discovered giant radio quasars, each spanning millions of light years.

Quasars are powered by supermassive black holes feeding on surrounding gas and dust through accretion disks. While much of this material falls inward, some is redirected by intense magnetic fields and expelled at near-light speeds as twin plasma jets. Over millions of years, these jets inflate vast radio-emitting lobes that shine brightly at low radio frequencies, making instruments like GMRT uniquely suited to detect them.

The study also reveals how environment shapes these cosmic behemoths. About 14% of the giant quasars reside near galaxy clusters and cosmic filaments, where denser surroundings can bend, slow, or distort their jets. This interaction often creates striking asymmetries between the two jets, offering clues about conditions in the early universe. Together, these discoveries provide a powerful new window into black hole evolution and the large-scale structure of the cosmos.

RUSSIA'S VISION FOR ARTIFICIAL GRAVITY IN SPACE

As the International Space Station (ISS) approaches the end of its operational life, space agencies are exploring new concepts to support long-term human presence in orbit. In this context, Russia has taken a conceptual step forward. On December 24, 2025, Russian state-owned company RSC Energia secured a patent for a space station design capable of generating artificial gravity.

The patented concept uses rotation to simulate gravity–an idea long proposed to address the challenges of prolonged spaceflight. The design includes a central axial module with radially attached habitable sections that rotate around it, creating centrifugal force. According to patent details reported by TASS, the station could generate about 0.5g by rotating at nearly five revolutions per minute with a radius of approximately 40 meters.

Illustrations accompanying a patent for an artificial gravity space station submitted by Russian state-owned Energia rocket company

The structure would combine static and rotating components connected through flexible, sealed joints to maintain pressure and stability. Such a station would require multiple launches and complex in-orbit assembly, underscoring the significant engineering challenges involved.

Artificial gravity could greatly benefit astronaut health by reducing muscle loss, bone density decline, and other effects of long-term exposure to microgravity. This makes the concept especially relevant for extended missions in low Earth orbit and future interplanetary travel.

However, challenges remain. Docking with a rotating station poses safety and operational difficulties, as acknowledged in the patent and earlier studies by NASA and private space firms.

Although no timeline or funding has been announced, the patent highlights ongoing interest in artificial gravity habitats. As the world prepares for a post-ISS era, such ideas may influence the design of next-generation space stations.

TRIAL, ERROR & PROGRESS: CHINA'S REUSABLE ROCKET EXPLODES ON LANDING

China marked a major step toward reusable spaceflight on December 2, 2025, when private launch company Landspace conducted the debut flight of its Zhuque-3 rocket, the country's first orbital-class reusable launch vehicle. Although the mission ended in a fiery explosion during landing, it represented a significant milestone for China's commercial space sector.

The 66-meter-tall stainless-steel rocket lifted off from the Jiuquan Satellite Launch Center, successfully completing ascent and placing its expendable second stage into orbit. This achievement validated Zhuque-3's core launch systems and propulsion performance.

Issues arose during recovery of the first-stage booster. After a controlled reentry, the booster initiated its landing burn but appeared to lose one engine, triggering a fire before crashing into the recovery zone. Landspace confirmed no injuries and noted the booster landed only meters from its target.

Despite the failed landing, the company termed the mission a technical success, citing successful tests of recovery systems, deep engine throttling, and attitude control. An investigation is underway to determine the cause of the anomaly.

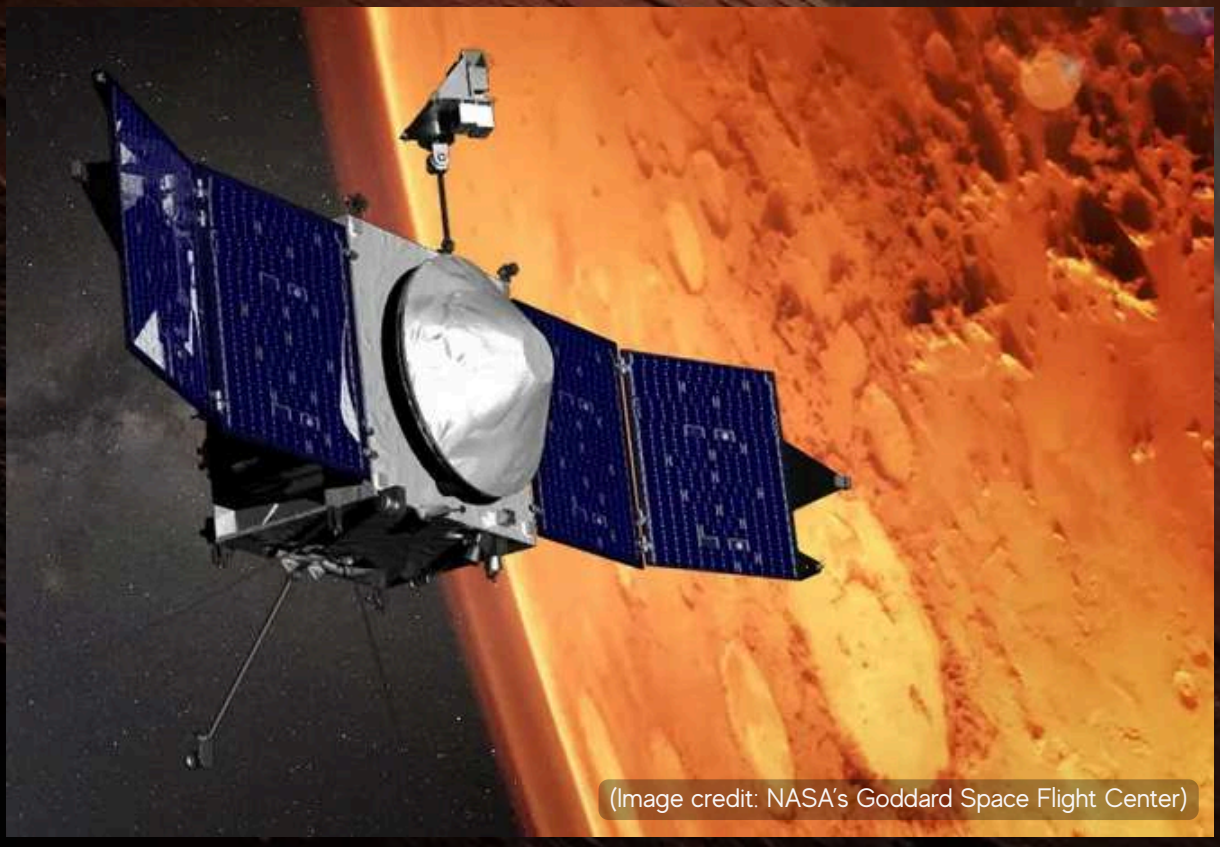
Designed similarly to SpaceX's Falcon 9, Zhuque-3 features a reusable first stage and an expendable upper stage, but uses liquid methane and liquid oxygen engines for cleaner, next-generation propulsion. With a payload capacity of about 18,300 kg to low Earth orbit, Zhuque-3 places China firmly in the global race for reusable launch vehicles–where progress is driven by iteration and learning.

NASA TEMPORARILY LOSES CONTACT WITH MAVEN ORBITER BEHIND MARS

NASA engineers are working urgently to restore communication with the MAVEN (Mars Atmosphere and Volatile EvolutioN) spacecraft after losing contact during a routine orbital pass around Mars. The anomaly occurred on December 6, 2025, when MAVEN passed behind the Red Planet, temporarily blocking its signal from Earth.

Such losses of signal are expected during planetary occultations, and NASA's Deep Space Network (DSN) typically reestablishes contact once a spacecraft emerges from behind a planet. However, when MAVEN was expected to reappear, the signal was not reacquired. In a December 9 update, NASA confirmed that spacecraft and mission operations teams are investigating the issue to determine the cause and assess recovery options.

Launched in November 2013 aboard a United Launch Alliance Atlas V rocket, MAVEN arrived at Mars in 2014 and has spent over a decade studying how the planet lost much of its atmosphere. Its instruments analyze atmospheric composition and interactions with the solar wind–key clues to understanding why Mars transformed from a potentially habitable world into the cold, dry planet seen today.



(Image credit: NASA's Goddard Space Flight Center)

Beyond science, MAVEN plays a vital operational role. It is one of five orbiters providing communications relay support for surface missions, including the Perseverance and Curiosity rovers. Alongside NASA's Mars Reconnaissance Orbiter and Odyssey, and ESA's Mars Express and Trace Gas Orbiter, MAVEN helps ensure continuous data flow between Mars and Earth.

Before the communication loss, MAVEN's telemetry showed a stable orbit and normal spacecraft health. If its trajectory remains unchanged, NASA will continue transmitting commands along its predicted path while diagnosing the anomaly. Further updates will be shared as more information becomes available.

WHAT'S UP IN THE SKY - JANUARY 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
Too close to the Sun to be seen properly, superior conjunction on 21 Jan.

Venus
Superior conjunction on 6 Jan, Sets 30 minutes after sunset on 31 Jan, appearing 99% illuminated.

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

Jupiter
Opposition on 10 Jan. Well-placed with excellent moon events. Bright gibbous Moon nearby on 3 and 31 Jan.

Saturn
A yellowish planet, visible high up in the western sky in the early evening.

Uranus
Well-placed in the constellation Taurus near the South of Pleiades star cluster, and is visible for most of the night.

Neptune
It is best viewed in the early evening, following Saturn across the sky

BRIGHT DEEP SKY OBJECTS

The Triangulum galaxy, also known as Messier 33, is sometimes said to be the farthest object visible with the unaided eye (Mag 5.7). The Triangulum galaxy, named for its location in the constellation Triangulum, is the 2nd-nearest spiral galaxy to our Milky Way, after the Andromeda galaxy. It's about 2.7 million-light-years from Earth.

M34 is a open cluster located in the constellation of Perseus. At magnitude +5.5, it's visible as a faint smudge to the naked eye and is easily identifiable with binoculars, where the brightest members are resolvable. A small telescope reveals up to 20 bright stars embedded in nebulosity with about 80 members visible in large scope.

M54 is a globular star cluster in the constellation Sagittarius, located about 87,000 light-years from Earth. Discovered by Charles Messier in 1778. Uniquely, M54 lies at the core of the Sagittarius Dwarf Galaxy, offering key insights into galaxy formation and the Milky Way's growth.

The Orion Nebula (Messier 42) is a bright diffuse nebula located south of Orion's Belt in the constellation Orion. With an apparent magnitude of 4.0, it is visible to the naked eye. About 1,344 light-years away, it is the nearest massive star-forming region to Earth, making it a key target for studying stellar birth.

Rocket launches in January 2026

GAGANYAAN-1: VALIDATING SYSTEMS FOR SAFE HUMAN SPACE TRAVEL

The Indian Space Research Organisation (ISRO) is set to launch Gaganyaan-1 aboard the human-rated LVM3 rocket in January 2026 from the Satish Dhawan Space Centre, Sriharikota. This landmark mission marks India's first uncrewed test flight under the Gaganyaan human spaceflight programme and represents a defining step in the nation's space history.

Gaganyaan-1 is a critical technology demonstration mission designed to validate systems required for safe human space travel. Its objectives include testing the performance and reliability of the human-rated LVM3 launch vehicle, evaluating the crew module's structure, avionics, navigation and thermal protection system during orbital flight and atmospheric re-entry.

LVM 3 Rocket (Credit: ISRO)

A major focus of the mission is the verification of the Crew Escape System, ensuring astronaut safety under emergency abort conditions. The mission will also assess environmental control and life-support technologies, radiation monitoring, and autonomous flight operations using instrumented human simulators.

In addition, microgravity experiments related to fluid physics, heat transfer, and material science will be conducted, along with demonstrations of precise re-entry, parachute deployment, and recovery operations in the Indian Ocean.

The LVM3, formerly known as GSLV Mk III, is ISRO's heavy-lift launch vehicle featuring two solid strap-on boosters, a liquid core stage, and a cryogenic upper stage. With successful missions such as Chandrayaan-2, Chandrayaan-3, and multiple commercial launches, LVM3 stands as India's most reliable rocket for human spaceflight.

India's astronaut corps, known as the Vyomnauts, comprises Indian Air Force test pilots trained by ISRO. Gaganyaan-1 lays the foundation for India's first crewed mission and future long-duration human space exploration.

ISRO'S IRNSS-1L MISSION

Scheduled for January 2026, the Indian Space Research Organisation (ISRO) will launch the IRNSS-1L (also designated as NVS-03) navigation satellite from the Satish Dhawan Space Centre, Sriharikota, using its Geosynchronous Satellite Launch Vehicle (GSLV).


GSLV Rocket (Credit: ISRO)

This advanced satellite will replenish and strengthen India's indigenous navigation constellation, NavIC. It will provide precise real time positioning, navigation, and timing services over India and the surrounding region using a new generation L1 band signal for enhanced civilian compatibility. Its continuous and robust data will aid users in terrestrial, aerial, and marine navigation, disaster management, and precise timing applications. IRNSS-1L (NVS-03) exemplifies the critical role of sovereign space systems in enhancing national resilience and technological self reliance by providing accurate, secure, and cost effective navigation services to support strategic autonomy and societal development.

PANDORA & TWILIGHT MISSIONS HEAD TO ORBIT


Pandora mission (Credit: NASA)

Scheduled for January 2026, the Pandora / Twilight rideshare mission is set to launch aboard a SpaceX Falcon 9 rocket from the United States. This rideshare mission will deploy multiple payloads into orbit, highlighting SpaceX's capability to provide cost-effective and reliable access to space for scientific and Earth observation missions.


Falcon 9 rocket (Credit: SpaceX)

Pandora is a NASA astrophysics mission designed to study exoplanet atmospheres by observing their host stars in visible and infrared wavelengths. By accurately characterizing stellar activity, Pandora will help scientists separate stellar effects from planetary atmospheric signals, improving the reliability of exoplanet climate and habitability studies.

Twilight is an Earth science mission focused on observing atmospheric aerosols and clouds during twilight conditions, a time that is difficult to study with conventional satellites. The mission will provide continuous data to improve climate models and weather prediction.

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

SETBACKS THAT BUILT SPACE SUCCESS

THE OTHER SIDE OF SPACE EXPLORATION: FROM FAILURE TO FUTURE

'BEFORE THE FIRST FOOTPRINT'

A failed mission is never truly a failure if it leads to greater success later.

On January 27, 1967, at Cape Kennedy's Launch Complex 34, three NASA astronauts lost their lives in a fire inside the Command Module of the Apollo 1 mission. It was NASA's first major public tragedy and one of the darkest moments in the agency's history. Apollo 1 was meant to be the first crewed mission of the Apollo program and was scheduled to launch on February 21, 1967.

Two years later, Neil Armstrong, Buzz Aldrin, and Michael Collins flew Apollo 11 to the Moon and back, leaving the first human footprints on the lunar surface.

Only 25 days before launch, astronauts Virgil I. "Gus" Grissom, Edward H. White, and Roger B. Chaffee were conducting a critical ground test of their spacecraft. The test was a full rehearsal for launch day. The crew was sealed inside the capsule, wearing their spacesuits, while the cabin was pressurized with pure oxygen.

Left to right - Gus Grissom, Ed White and Roger Chaffee. (Credits: The LIFE Picture Collection)

During the test, the spacecraft was supposed to switch from external power to its internal power system. Before the test could be completed, a sudden flash fire broke out inside the capsule. Events unfolded in seconds. At 6:30:54 p.m., a voltage spike was recorded as the crew continued their checklist.

Ten seconds later, a startled voice, possibly saying "Hey!" or "Fire!", was heard. At 6:31:06, Roger Chaffee clearly reported, "We've got a fire in the cockpit." Moments later, distorted and frantic transmissions suggested the crew was trying to escape. All communication ended at 6:31:22. All three astronauts died from toxic gases released during the fire.

Recovery and Safety Improvements After Apollo 1: The Apollo 1 tragedy prompted NASA to reassess its spacecraft design, testing methods, and safety culture. The Command Module hatch was redesigned to open outward in seconds, allowing quick escape during emergencies. Fire safety became a priority, with fire extinguishers, oxygen masks, and isolation panels added.

Highly flammable materials were removed and replaced with safer, fire-resistant alternatives. Electrical wiring was improved with better insulation and safer routing. Ground tests began using closer monitoring of astronauts' health. Together, these changes laid the foundation for safer human spaceflight.

SPACE PARADOXES: GLITCHES IN THE COSMOS

Some ideas sound sensible at first, until a closer look reveals their complex nature. A paradox is one such idea, logical on the surface, yet contradictory at its core. It is a riddle with no clear answer. Simply put, a paradox is when something appears both true and impossible at the same time.Glitches in the Cosmos is a voyage through the universe where certainty breaks, and paradoxes emerge.

Can One Erase Their Own Existence?

Imagine this, a person, let's call them a time traveller, builds a time machine and journeys back into the past. In theory, the traveller could kill their grandfather before he has any children. If that happens, the traveller's parent would never be born, and neither would the traveller. This leads to a deeply unsettling question: if the traveller was never born, who went back in time and killed the grandfather?

Welcome to the Grandfather Paradox

This famous thought experiment emerged in the early 20th century, when science fiction writers first began seriously exploring time travel. Since then, it has become one of the most mind-bending ideas in physics, philosophy, and science fiction.
In everyday life, cause precedes effect. The past shapes the present, and the present moves into the future. Time flows in one direction, and that linearity feels safe and intuitive. But if the future can reach back and change the past, the past could erase the very future that caused the change. The Grandfather Paradox doesn't merely bend logic; it breaks it.

Proposed Solutions to the Paradox:
Self-Consistency Principle - Proposed by physicist Igor Novikov in the 1980s, this principle states that the universe forbids events that lead to contradictions. Even if time travel were possible, a traveller would never be able to change the past in a way that creates a paradox. Something, however unlikely, would always occur to preserve a self-consistent timeline.

Parallel Universes - According to this idea, reality is made up of countless parallel universes. If a time traveller alters the past, they don't change their original timeline; instead, they create a new one. The paradox disappears because the original universe remains untouched, while the altered events unfold in a separate reality.

Deterministic Universe - This approach assumes the universe is fully deterministic every event, including time travel and a traveller's actions, is fixed in advance. In this view, the paradox cannot occur because a time traveller can only do what has already happened. The past cannot be changed, only fulfilled.

Despite its simple setup, the Grandfather Paradox exposes deep cracks in our understanding of time and causality. Each proposed solution offers a way to protect logic, yet none is universally accepted. What makes the paradox enduring is not its answer, but the questions it forces us to ask about reality, and the direction of time. Until time travel moves from theory to experience, the paradox remains a reminder that the universe may be far stranger than our everyday logic allows.

Happy Birthday

January 01, 1894

Satyendra Nath Bose

Satyendra Nath Bose (January 1, 1894 – February 4, 1974) was an eminent Indian physicist whose work transformed modern science. In 1924, he developed Bose–Einstein statistics, laying the foundation for quantum mechanics. His collaboration with Albert Einstein led to the prediction of the Bose–Einstein Condensate. Particles known as bosons are named in his honor. Bose's legacy continues to shape physics, symbolizing intellectual brilliance, curiosity and India's lasting contribution to global science.

Stephen Hawking

Stephen Hawking (January 8, 1942 – March 14, 2018) was one of the most influential theoretical physicists of modern times. He made groundbreaking contributions to cosmology, particularly the discovery of Hawking radiation, which revealed that black holes can emit energy. Despite severe physical challenges, his work and writings, including A Brief History of Time, inspired millions and reshaped our understanding of the universe. He remains a powerful symbol of resilience, curiosity and the limitless power of the human mind.

January 08, 1942

January 13, 1949

Rakesh Sharma

Rakesh Sharma (January 13, 1949) is India's first astronaut and a national icon of space exploration. A distinguished Indian Air Force pilot, he flew aboard Soyuz T-11 in 1984 as part of the Soviet Intercosmos program, spending eight days in space. His historic mission made India the 14th nation in space, inspiring generations with his iconic words, "Saare Jahan Se Accha," and igniting a lasting national passion for space exploration and scientific ambition.

Happy Birthday

January 14, 1851

Ernst Hartwig

Ernst Hartwig (May 9, 1851 – September 3, 1923) was a German astronomer remembered for discovering Supernova 1885A (S Andromedae) in the Andromeda Galaxy. Observed in 1885, it became the first recorded supernova beyond the Milky Way, challenging existing views of the universe's scale. At the time, Andromeda was thought to be a nebula within our galaxy, making Hartwig's observation especially significant. His work helped lay the foundation for understanding stellar explosions and reinforced the idea that the universe extends far beyond the Milky Way.

Buzz Aldrin

Buzz Aldrin (January 20, 1930) is an American astronaut, aerospace engineer, and U.S. Air Force veteran, best known as the second person to walk on the Moon during NASA's Apollo 11 mission in 1969. He played a crucial role in lunar surface operations and scientific experiments, contributing to one of humanity's greatest achievements. Beyond Apollo 11, Aldrin has been a strong advocate for space exploration, promoting missions to Mars and the long-term human presence in space. His legacy continues to inspire curiosity, innovation, and exploration across generations.

January 20, 1930

January 25. 1736

Joseph-Louis Lagrange

Joseph-Louis Lagrange (January 25, 1736 – April 10, 1813) was an Italian-French mathematician and astronomer whose work laid the foundations of modern mathematics and celestial mechanics. He made major contributions to calculus, number theory, and classical mechanics, most notably Lagrangian mechanics, which reformulated Newton's laws. Lagrange also identified the Lagrange points, positions in space where gravitational forces balance, now crucial for space missions. His ideas continue to shape physics, astronomy and space science today.

ASTRONOMICAL EVENTS - JANUARY 2026

QUADRANTIDS METEOR SHOWER: FIREWORKS OF THE NEW YEAR

Every January begins with one of the most spectacular yet brief meteor displays of the year, the Quadrantids meteor shower. Unlike many long-lasting showers, the Quadrantids peak sharply, rewarding skywatchers with a short but intense burst of celestial fireworks that often rivals the Perseids and Geminids.

The Quadrantids are active from December 28 to January 12. Still, their maximum peak occurs during the early morning hours of January 4, 2026, when observers may witness up to 60–120 meteors per hour under ideal dark-sky conditions.

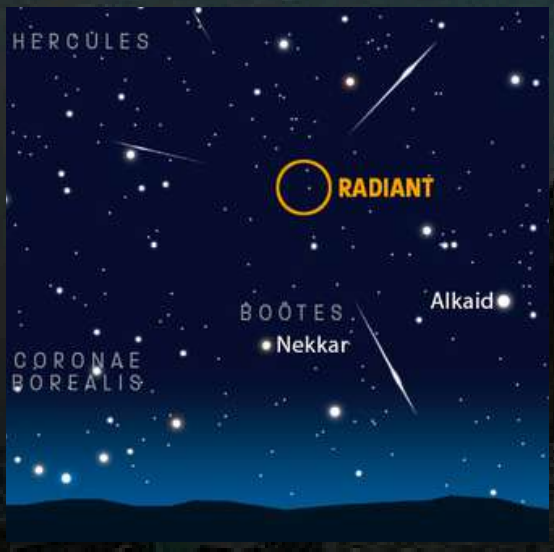
Origin of the Quadrantids:

The Quadrantids are produced when Earth passes through debris left behind by the near-Earth asteroid 2003 EH_1, believed to be the remnant of an extinct comet. Unlike cometary dust trails that spread evenly, the Quadrantid stream is narrow and dense – which explains the shower's short-lived but powerful peak.

The shower gets its name from the now-obsolete constellation Quadrans Muralis, which once occupied a region of sky near Boötes. Though the constellation no longer exists, the meteor shower preserves its legacy.

How to Observe:

In January 2026, conditions are particularly favourable. The Moon will be in a waning crescent phase, rising late in the night and causing minimal interference during the shower's peak. Skywatchers should look forward to the night of January 3 into the early morning of January 4, with the predicted maximum occurring between 2:30 AM and dawn (IST). Under dark skies, patient observers may witness 60 to 120 meteors per hour, though even brief observation windows can be rewarding.



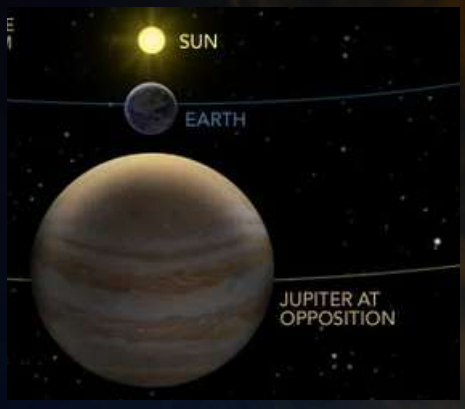
The Quadrantids may be brief, but they leave a powerful impression. For a short window each January, the silent winter sky comes alive as ancient fragments of a long-lost comet burn brightly in Earth's atmosphere, marking the year's first celestial celebration.

As Earth sweeps through ancient debris at tens of kilometers per second, each meteor becomes a fleeting message from the Solar System's past.

So, wrap up warm, set an early alarm, and welcome January 2026 beneath a sky alive with motion, mystery, and light.

THE SKY FULL OF COSMIC GIANTS & WANDERERS

JUPITER AT OPPSITION



Jupiter reaches opposition on mid-January 10 2026, making it visible for the entire night. The planet rises in the eastern sky around sunset (about 6:30–7:00 PM IST), reaches its highest point in the sky near local midnight (around 12:00–1:00 AM IST), and sets in the western sky by sunrise.

This period around midnight marks the peak viewing time, when Jupiter appears brightest and atmospheric conditions are most favourable for observing its cloud bands and moons.

During opposition, Jupiter is at its closest approach to Earth, making its cloud bands, Great Red Spot, and four Galilean moons especially rewarding to observe. Even with the naked eye, Jupiter appears as a brilliant, steady object, outshining every star in the night sky.

Passing Wonders of the Solar System

Comet 24P/Schaumasse

Position of Comet Schaumasse throughout the month. Credit: Astronomy, Roen Kelly

Comet 24P/Schaumasse, a short-period comet, reaches perigee on January 4, 2026, marking its closest approach to Earth. Although it is not visible to the naked eye, the comet becomes a favourable target for binoculars and small telescopes under dark-sky conditions. The best time to observe is during the late night to pre-dawn hours (around 11:00 PM to 5:00 AM IST), when the comet is higher above the horizon and sky glow is minimal. The comet's position shifts from night to night, so observers are advised to use updated sky charts or planetarium apps to locate it accurately.

Comet C/2024 E1 (Wierzchos)

The position of comet Wierzchos in the constellation of Microscopium on 16, Jan 2026

Comet C/2024 E1 (Wierzchos) reaches perihelion on January 20, 2026, its closest point to the Sun, when increased solar heating may enhance its visibility. While the comet is not expected to be naked-eye bright, it becomes an interesting target for binoculars and small to medium telescopes. The best viewing window is from late night to early morning (approximately 12:00 AM to 5:30 AM IST), when the comet gains altitude and sky conditions are darkest.

WHEN EARTH DRAWS NEAREST: PERIHELION JANUARY 2026

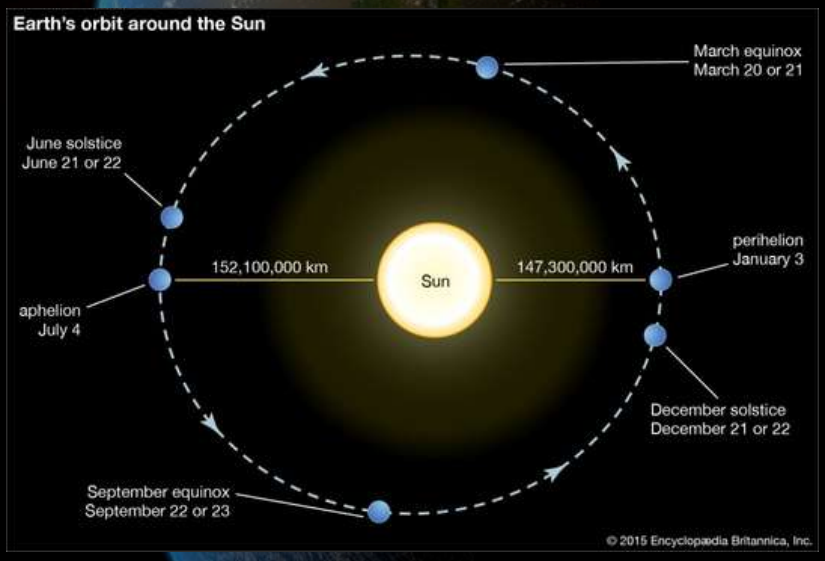
Every year in early January, Earth reaches a quiet yet powerful milestone in its journey around the Sun perihelion, the point where our planet is closest to the Sun. In 2026, this occurs on January 3, when Earth is approximately 147 million kilometres away from its parent star. This moment highlights the elegant mechanics governing our Solar System.

At perihelion, Earth moves slightly faster in its orbit due to the Sun's stronger gravitational pull. This change is imperceptible in daily life, yet it is precisely measured by astronomers and plays a role in shaping Earth's orbital rhythm through the year.

What Exactly Happens at the Perihelion?

Earth's orbit is not a perfect circle but a gentle ellipse. As a result, the distance between Earth and the Sun changes slightly over the year. At perihelion, Earth is closest; six months later, it reaches aphelion, its farthest point.

Despite popular belief, perihelion does not cause summer in the Northern Hemisphere. Seasons are controlled by Earth's 23.5° axial tilt, not distance from the Sun. In fact, Earth is closest to the Sun during Northern Hemisphere winter and farthest during Northern Hemisphere summer.



For centuries, understanding perihelion has helped scientists unlock the laws of planetary motion. It played a key role in confirming Kepler's laws, explaining why planets speed up and slow down as they orbit the Sun.

Perihelion also reminds us that Earth's climate and seasons are governed by geometry and tilt, not proximity alone a beautiful balance written into our planet's design.

Earth's perihelion is a silent turning point in our cosmic journey. Even as winter deepens in the Northern Hemisphere, our planet is at its closest embrace with the Sun, bound by gravity and motion.

Though invisible to our eyes, this moment connects mathematics, motion, and time a reminder that astronomy is not only about what we see in the sky, but about understanding the paths we travel through space.

As the year begins, perihelion quietly marks Earth's place in the grand rhythm of the cosmos.

CONJUNCTIONS FOR THE MONTH

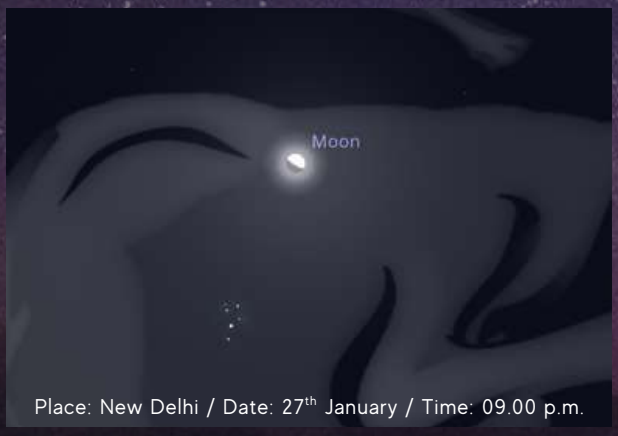
A phenomenon grabs the imagination of scientists and stargazers alike in the vast panorama of the night sky, where stars shine like distant diamonds and planets roam over the cosmic canvas. Conjunctions, those ethereal moments in the heavens when heavenly bodies appear to collide, provide a mesmerizing sight that connects us to the beauty of the cosmos. The word "Conjunction" comes from Latin, meaning to join together.

From Earth's perspective, a conjunction occurs when two planets or a planet and the Moon or Sun align. Solar conjunctions are invisible to us. Moon-planet conjunctions occur throughout the month, every month, as the Moon passes past each planet. The planets in The Great Conjunction and when multiple align are rare and captivating conjunctions. Technically speaking, objects are said to be in conjunction in that instant when they have the same right ascension on our sky's dome. Practically speaking, objects in conjunction will likely be visible near each other for some days.

Conjunction of Moon and Saturn

On January 23, the Moon passes close to Saturn, creating a graceful conjunction in the early night sky. The pairing can be seen in the southeastern sky after sunset. Saturn appears as a soft golden object near the Moon and is visible to the naked eye, while a small telescope reveals its iconic rings.

Place: New Delhi / Date: 23rd January / Time: 10.00 p.m.



Place: New Delhi / Date: 27th January / Time: 09.00 p.m.

Conjunction of Pleiades and Moon

On January 27, the Moon passes close to the Pleiades star cluster (M45), creating a beautiful conjunction in the evening sky. The pairing is visible in the eastern sky after sunset, with the best viewing time between 6:30 and 9:00 PM IST. While the Pleiades can be seen with the naked eye under dark skies as a small, misty patch of stars, binoculars provide the best view, revealing the cluster's delicate star pattern beside the Moon.

Conjunction of Moon and Jupiter

The month ends with another beautiful encounter as the Moon again approaches Jupiter on January 31. This conjunction is visible in the eastern sky after sunset, with the best viewing window from 7:00 to 10:00 PM IST. Easily seen with the naked eye, this pairing is especially rewarding through binoculars, which show Jupiter's moons changing position over the course of the night.

Place: New Delhi / Date: 31st January / Time: 10.20 p.m..

ASK THE UNIVERSE

Introducing Our Year-Long Student Q&A Feature!

Have you ever looked at the night sky and wondered why stars shine, how rockets escape Earth, or what lies beyond our galaxy? This year, your curiosity takes center stage in our magazine!

We are excited to launch a special monthly Student Q&A Section, designed to turn your questions about space, astronomy, planets, rockets, astronauts, and the universe into learning moments for everyone. Each edition will feature student-asked questions answered by experts, making curiosity the true star of every issue.

How the Student Q&A Feature Works?

Every month, a Google Form link will be shared for students to submit their questions. The same link can be used throughout the year, so you can ask whenever curiosity strikes.

From all the entries, we will select the Top 5 most interesting questions each month, which will be answered in the next edition of the magazine. The best part? The student's name and class will be proudly featured along with the answer!

Questions that are not selected right away won't be ignored—they will be carried forward and answered in upcoming editions.

Why This Is Exciting?

- **Encourages curiosity and scientific thinking**
- **Gives students a chance to be featured in the magazine**
- **Builds a learning community where every question matters**
- **Helps students explore space science beyond textbooks**
- **Inspires independent thinking and a love for discovery**
- **Connects classroom learning with real-world space science**

Your Curiosity Shapes Our Magazine

- Keep observing the sky and the world around you
- Keep wondering about the mysteries of the universe
- Keep asking questions—big or small
- Your question could be the next one to shine in our upcoming editions!

Hey Universe, We've Got Questions!

https://forms.gle/b7aakBcarQnvG2Ba7

STORIES OF INDIA'S GREATEST MINDS

Dr. Vikram Sarabhai
"The Father of India's Space Program"

Who is Dr. Vikram Sarabhai?
Dr. Vikram Sarabhai is celebrated as the Father of the Indian Space Programme. He was a visionary scientist who believed that space technology could transform India and help the nation progress scientifically and socially.

Why is he important to India's space journey?
At a time when India was still developing, he dreamed big. He believed India should never be behind in science and technology. His vision was not just to explore space, but to use space for education, communication, weather forecasting, and national development. His ideas shaped India's future in space science.

What did he achieve?
Dr. Sarabhai founded ISRO (Indian Space Research Organisation) and laid the foundation for India's satellite and space research programs. Under his leadership, India moved from dreaming about space to actually building rockets, satellites, and strong scientific institutions.

How did his vision continue after him?
Great leaders like Dr. A.P.J. Abdul Kalam carried forward his dream by building powerful rockets and strengthening India's space technology. India launched remarkable missions like Aryabhata, PSLV, and GSLV, proving India's capability in space.

Who followed his path into space?
India's journey continued with heroes like Rakesh Sharma, the first Indian in space, and inspiring astronauts like Kalpana Chawla and Sunita Williams, who showed the world India's strength in human space exploration.

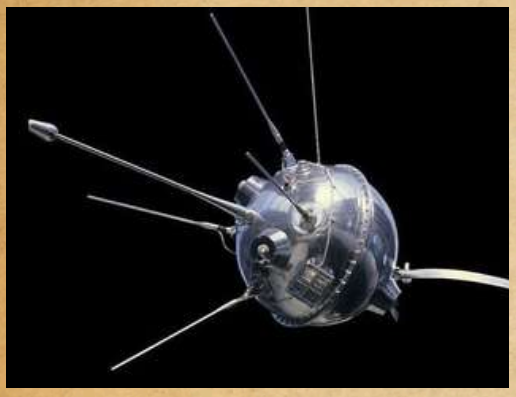
What has India achieved today?
Missions like Chandrayaan and Mangalyaan placed India among the world's leading space nations. The success of Chandrayaan-3, landing near the Moon's south pole, made global history. Now, Gaganyaan aims to send Indian astronauts to space again.

What does this mean for the future?
As we celebrate our Year of Indian Space Heroes, Dr. Vikram Sarabhai leads our journey as the January inspiration, reminding us that courage, imagination, and determination can take India beyond the stars.

HISTORICAL EVENTS OF JANUARY

Discovery of Ceres

On January 1, 1801, Italian astronomer Giuseppe Piazzi discovered Ceres, the first identified asteroid, while observing from the Palermo Observatory. Initially mistaken for a comet, Ceres was later recognized as a new celestial body orbiting between Mars and Jupiter. Mathematician Carl Friedrich Gauss calculated its orbit, enabling astronomers to relocate it after it was briefly lost. Once considered a planet, Ceres was reclassified as a dwarf planet in 2006. Its discovery inaugurated asteroid studies and remains pivotal in understanding planetary formation. (image credits: stillnessinthestorm.com).

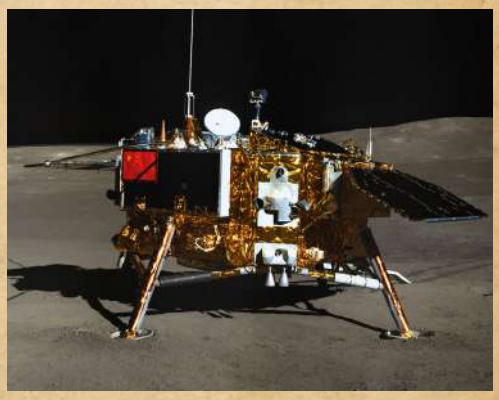


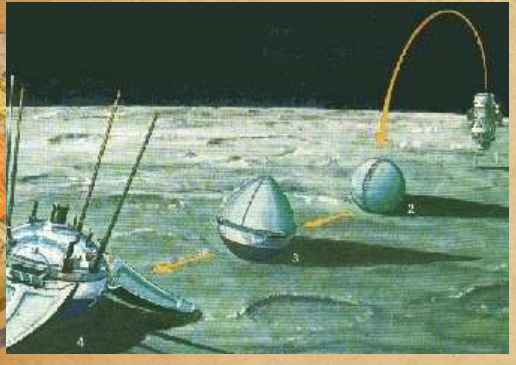
Luna 1: First Spacecraft to Escape Earth's Gravity

On January 2, 1959, the Soviet Union launched Luna 1, the first spacecraft to escape Earth's gravitational field. Intended to impact the Moon, a guidance error caused it to miss, passing within 6,000 kilometers of the lunar surface before entering orbit around the Sun. Nicknamed the "First Cosmic Rocket," Luna 1 carried scientific instruments to measure solar wind, cosmic rays, and magnetic fields. Its pioneering mission marked humanity's first step toward interplanetary exploration and established the foundation for future lunar probes. (image credits: alchetron.com).

Chang'e 4: First Landing on the Lunar Far Side

On January 3, 2019, China's Chang'e 4 mission achieved the first soft landing on the Moon's far side, touching down in the Von Kármán crater within the South Pole–Aitken Basin. The lander and its rover, Yutu-2, carried instruments to study geology, low-frequency radio astronomy, and biological experiments. This pioneering mission overcame communication challenges using the Queqiao relay satellite. Chang'e 4 marked a historic milestone in lunar exploration, expanding scientific knowledge of the Moon's hidden hemisphere and demonstrating China's growing space capabilities. (image credits: skyandtelescope.org).





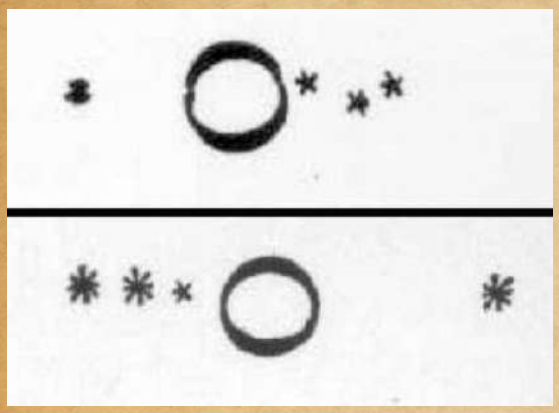
Luna 9 Launch

On January 3, 1966, the Soviet Union launched Luna 9, a historic mission in the Luna program aimed at exploring the Moon. The spacecraft was designed to achieve the first soft landing on the lunar surface and transmit images back to Earth. Luna 9 later succeeded in sending the first-ever photographs from the Moon's surface, proving that the lunar ground could support landers and paving the way for future robotic and human exploration. (image credits: www.reddit.com).

HISTORICAL EVENTS OF JANUARY

Mars Rover Spirit Landing

On January 4, 2004, NASA's Mars Exploration Rover Spirit successfully landed in Gusev Crater, beginning a landmark mission to study the Martian surface. Designed to search for signs of past water activity, Spirit carried advanced instruments to analyze rocks and soil. Over its extended mission, the rover discovered evidence of ancient hydrothermal activity and water-altered minerals, greatly advancing knowledge of Mars's geologic history. Spirit operated far beyond its planned 90-day mission, continuing scientific exploration until communications ceased in 2010. (image credits : www.space.com).



Galileo Discovers Jupiter's Moons

On January 7, 1610, Italian astronomer Galileo Galilei used his telescope to observe four bright objects near Jupiter, later identified as its largest moons: Io, Europa, Ganymede, and Callisto. These "Galilean satellites" were the first celestial bodies discovered orbiting another planet, challenging the geocentric worldview that placed Earth at the universe's center. Galileo's discovery provided strong evidence for the Copernican heliocentric model and marked a turning point in astronomy, demonstrating the power of telescopic observation to revolutionize scientific understanding. (image credits: www.reddit.com).

First Known Interstellar Meteor

On January 8, 2014, a small meteor entered Earth's atmosphere over Papua New Guinea and was later identified as the first known interstellar object to impact our planet. Initially cataloged as CNEOS 2014-01-08, its unusually high velocity suggested an origin beyond the Solar System. In 2022, the U.S. Space Command confirmed its interstellar nature, making it the earliest detected visitor from another star system. The event opened new avenues for studying interstellar materials and broadened understanding of cosmic objects traversing our galaxy. (image credits: metro.co.uk).

Huygens Lands on Titan

On January 14, 2005, the European Space Agency's Huygens probe made history by achieving the first landing on Saturn's moon Titan. Delivered by NASA's Cassini spacecraft, Huygens descended through Titan's dense atmosphere, transmitting data on its winds, pressure, and chemical composition. Images revealed a landscape of icy plains, drainage channels, and evidence of liquid hydrocarbons. The mission provided unprecedented insights into Titan's Earth-like processes, marking a milestone in planetary exploration and expanding knowledge of potentially habitable environments beyond our planet. (image credits: www.sciencephoto.com).

HISTORICAL EVENTS OF JANUARY

Stardust Returns Samples to Earth

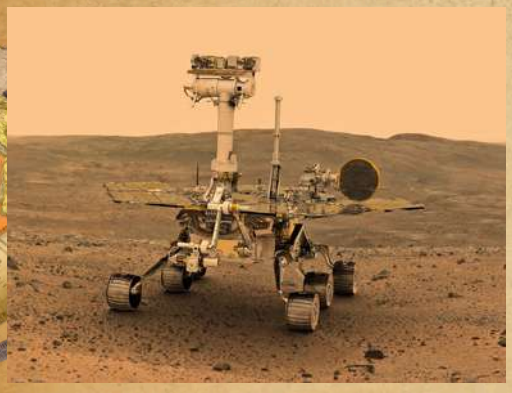
On January 15, 2006, NASA's Stardust spacecraft successfully returned to Earth carrying the first samples collected from a comet. Launched in 1999, Stardust flew through the coma of Comet Wild 2 in 2004, capturing dust particles in a special aerogel collector. The sample capsule parachuted safely into Utah's desert, delivering invaluable material for laboratory analysis. These microscopic grains provided direct evidence of complex organic compounds and minerals, offering unprecedented insights into the early Solar System and the origins of planetary formation. (image credits: www.jpl.nasa.gov).

New Horizons Launches Toward Pluto

On January 19, 2006, NASA launched the New Horizons spacecraft from Cape Canaveral, beginning humanity's first mission to Pluto and the Kuiper Belt. Traveling at record speed, it became the fastest spacecraft ever launched, crossing the Moon's orbit in just nine hours. After a nine-year journey, New Horizons conducted a historic flyby of Pluto in July 2015, revealing its diverse geology and atmosphere. The mission continues to explore distant Kuiper Belt objects, expanding knowledge of the Solar System's outer frontier. (image credits: www.jhuapl.edu).

Discovery of First Exoplanets Around a Pulsar

On January 22, 1992, astronomers Aleksander Wolszczan and Dale Frail announced the discovery of the first confirmed exoplanets, orbiting the pulsar PSR B1257+12. Using radio observations at the Arecibo Observatory, they detected subtle variations in the pulsar's timing, revealing the presence of planetary companions. These planets, located 2,300 light-years away in Virgo, were the first worlds found outside our Solar System. The breakthrough revolutionized astronomy, proving that planetary systems exist beyond the Sun and opening a new era in the search for extraterrestrial worlds. (image credits: www.sciencealert.com).

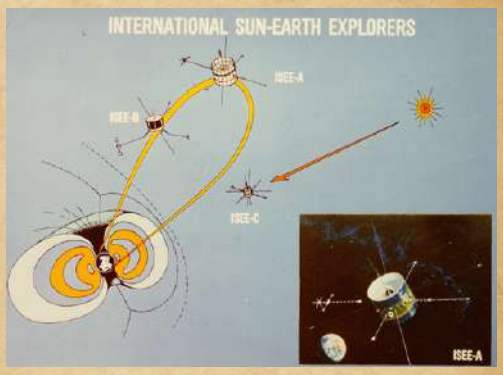


Mars Rover Opportunity Landing

On January 25, 2004, NASA's Mars Exploration Rover Opportunity successfully landed in Meridiani Planum, beginning one of the most remarkable missions in planetary exploration. Designed to operate for 90 days, Opportunity far exceeded expectations, functioning for nearly 15 years. The rover discovered hematite-rich rocks and evidence of ancient water, confirming Mars's wetter past. Its extensive travels across the Martian surface provided unprecedented geological insights. Opportunity's longevity and discoveries made it a symbol of resilience and a cornerstone in Mars exploration history. (image credits: ar.inspiredpencil.com)

HISTORICAL EVENTS OF JANUARY

International Sun-Earth Explorer-1 Activation



On January 26, 1978, the International Sun–Earth Explorer-1 (ISEE-1) spacecraft was activated, marking a major step in international space science collaboration between NASA and ESA. Positioned between the Earth and the Sun, ISEE-1 was designed to study the interaction of the solar wind with Earth's magnetosphere. Its observations greatly improved understanding of space weather processes and laid the foundation for future Sun–Earth monitoring missions. (image credits: UCLA)

International Space Station Agreements Signed

On January 29, 1998, representatives from fifteen nations signed agreements establishing the framework for the International Space Station (ISS). The accords united NASA, Roscosmos, ESA, JAXA and CSA in a cooperative venture to build and operate the largest human-made structure in space. These agreements outlined responsibilities for construction, research, and long-term habitation, symbolizing unprecedented global collaboration in science and technology. The ISS has since become a cornerstone of international space exploration, fostering scientific discovery and strengthening partnerships beyond Earth. (image credits: www.esa.int).

Explorer 1 Launches into Orbit

On January 31, 1958, the United States successfully launched Explorer 1, its first satellite, aboard a Juno I rocket from Cape Canaveral. Developed by the Army Ballistic Missile Agency and Jet Propulsion Laboratory, the mission marked America's entry into the Space Age. Explorer 1 carried scientific instruments that detected the Van Allen radiation belts, a groundbreaking discovery in space physics. The satellite's success boosted U.S. prestige during the Cold War and established satellite research as a cornerstone of modern space exploration. (image credits: science.nasa.gov).

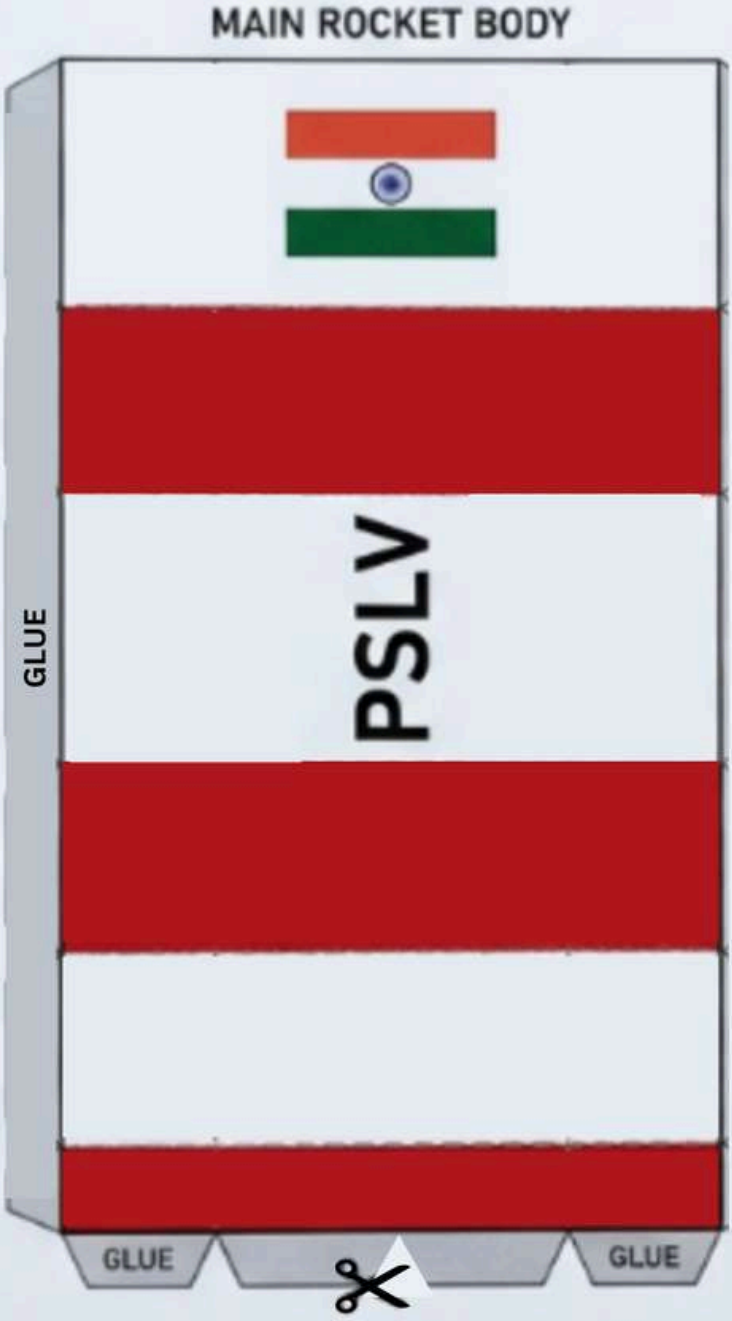
Ham the Chimp Launched into Space

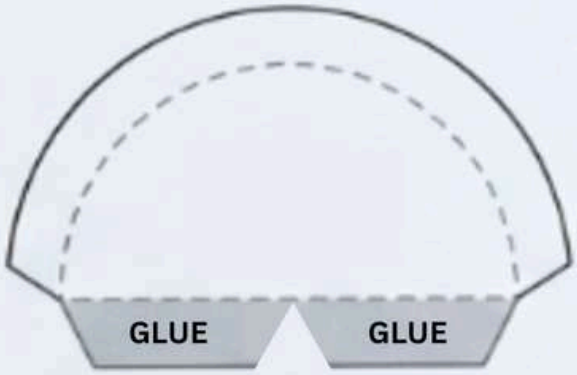
On January 31, 1961, NASA launched Ham the Chimp aboard a Mercury-Redstone rocket from Cape Canaveral, marking the first primate flight in the American space program. Ham's mission tested life-support systems and the effects of space travel on living organisms. He performed tasks during the suborbital flight, proving astronauts could function under space conditions. The successful mission paved the way for human flights, including Alan Shepard's launch later that year and demonstrated the readiness of Project Mercury for crewed exploration. (image credits: science.nasa.gov)

COSMIC JOURNEY- THE WHISPER FROM THE STARS

Mission: Do It Yourself

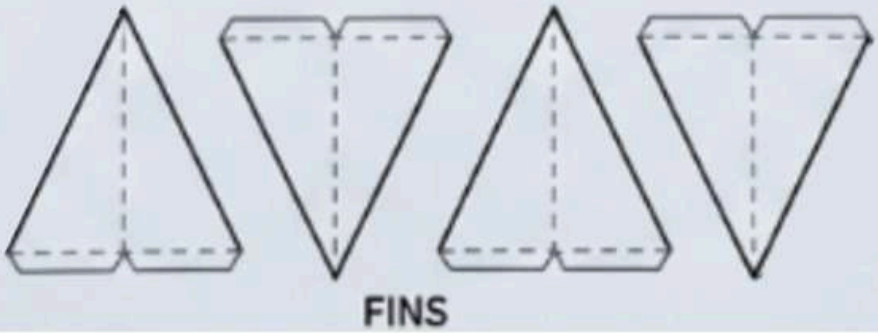
PSLV ROCKET PAPER CRAFT TEMPLATE

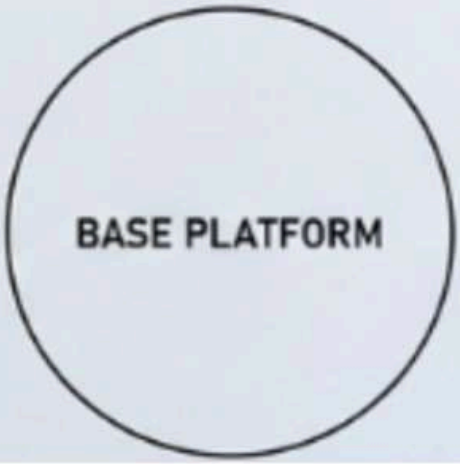




INSTRUCTIONS

- Carefully cut out all the template parts and fold all dashed lines.
- Apply glue to the side glue tab of the main rocket body and roll it into a cylinder.
- Apply glue to the nose cone tabs, stick both tabs together and shape it into a cone.
- Attach the cone to the top of the rocket body.
- Glue the circular base platform under the rocket.
- Apply glue to the fin tabs and attach fins evenly around the bottom of the rocket body.





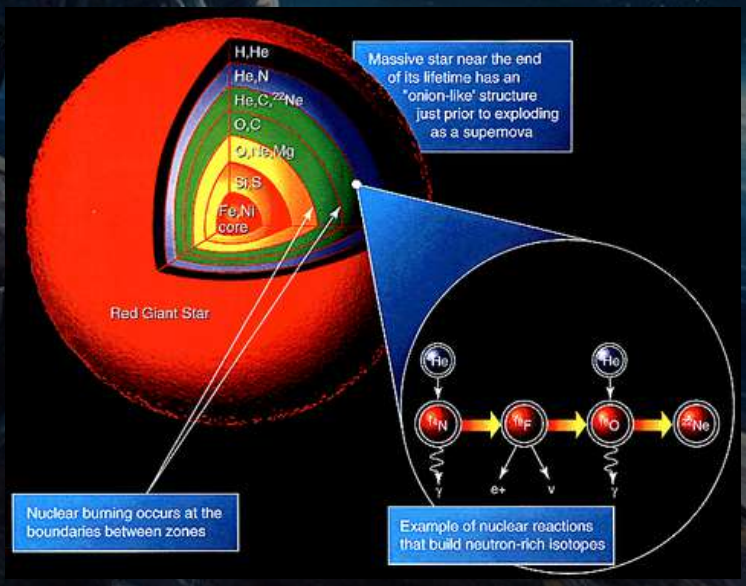
ASTRONOMY & SPACE TERM

SPAGHETTIFICATION

Spaghettification is a powerful gravitational effect that occurs near extremely dense objects such as black holes and, to a lesser extent, neutron stars. This phenomenon was popularized by physicist Stephen Hawking, who described it in his works. Gravity becomes stronger as distance decreases. Near a black hole, the change in distance between an object's head and feet may be only a few meters, yet the difference in gravity across that small distance can be enormous. As a result, the object is stretched lengthwise toward the black hole. This extreme stretching makes the object resemble a long strand of spaghetti, giving the effect its name. Spaghettification highlights how gravity behaves in extreme environments and helps scientists understand the nature of black holes and spacetime.

NUCLEOSYNTHESIS

Nucleosynthesis is the cosmic process that creates new atomic nuclei, forming the elements in the universe. It began minutes after the Big Bang, producing light elements like hydrogen, helium and traces of lithium.



Later, inside stars, stellar nucleosynthesis fuses lighter elements into heavier ones, such as carbon, oxygen, and iron, releasing energy that powers the stars. The heaviest elements, like gold and uranium, form during supernovae or neutron star collisions, where extreme temperatures and pressures enable rapid nuclear reactions. Nucleosynthesis explains the origin of the elements in planets, stars, and even our bodies, connecting us directly to the cosmos.

ALL THE ABOVE EVENTS ARE AS PER INDIAN STANDARD TIME AND WILL BE VISIBLE FROM THE INDIAN SUBCONTINENT

MAJOR ASTRONOMICAL EVENTS

Conjuction

When the Moon or a planet appears especially close either to another planet or to a bright star. Also used when Moon or Planet sometimes is close to bright Deepsky objects

Eclipse

An event that occurs when the shadow of a planet or moon falls upon a second body

Elongation

The angular distance the Moon or a planet is from the Sun. The inner planets of Mercury and Venus are best seen when at maximum Elongation, and thus are highest above the horizon before sunrise or after sunset.

Equinox

The two times each year, near March 20th and September 22nd, when the Sun is directly overhead at noon as seen from Earth's equator. On an equinox date, day and night are of equal length.

Solstice

The two times each year, around June 20th and December 21st, when the Sun is farthest north or south in the sky. At the summer solstice, the day is longest and the night is shortest, and vice versa at the winter solstice.

Meteor Shower

An increase in meteor activity at certain times of the year due to Earth passing through a stream of particles along a comet's orbit around the Sun.

Occultation

When the Moon or a planet passes directly in front of a more distant planet or star

Opposition

When a planet or asteroid is opposite the Sun in the sky. At such times, the object is visible all night - rising at sunset and setting at sunrise.

Full Moon

A Full Moon occurs when the entire face of the moon is fully illuminated by the sun. Its monthly names, like "Harvest Moon" or "Wolf Moon," come from ancient traditions reflecting Seasonal Events or Folklore.

Transit

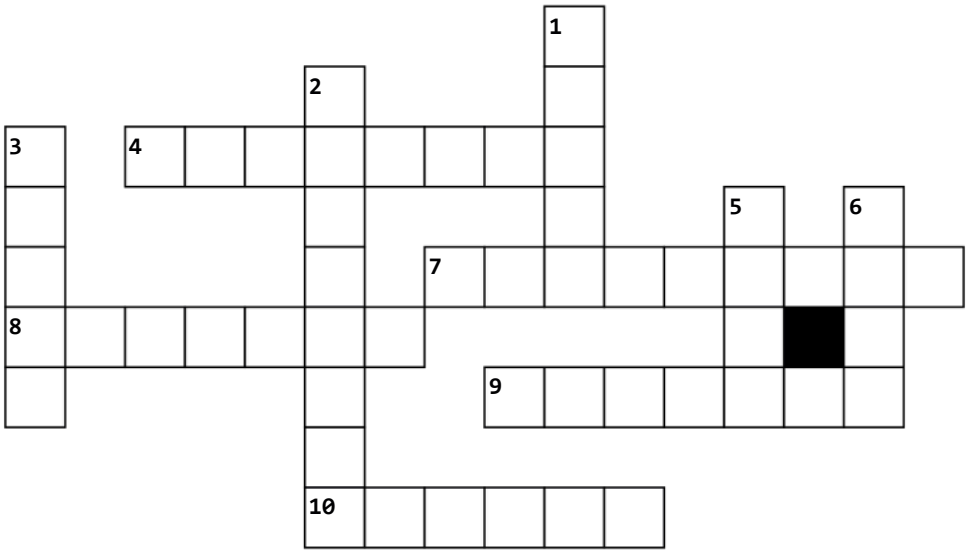
A transit occurs when a smaller celestial object passes in front of a larger one, like mercury or venus crossing the sun, or a moon of jupiter transiting jupiter, revealing details about their size and orbit.

NOTES

- Meteor showers are best observed from late evening until the early morning of the following day.
- Elongation dates are based on the highest altitude of the inner planet as seen after sunset or before sunrise.
- The lunar occultation of Regulus on 30th march can be seen only in south india (Time: 02:10 AM IST - 03:15 AM IST).
- The lunar occultation of Venus on 14th september can be seen in complete South India and parts of Central, East and West India. Not visible in North India. (Time: 05:00 PM IST - 07:10 PM IST). Please note Occultation begins during day time in India.
- The lunar occultation of Jupiter on 3rd November can be seen only in southern latitudes of India (Time: 02:21 AM IST - 03:43 AM IST).
- The total lunar eclipse on 3rd March will only be seen by Andaman & Nicobar Islands and North Eastern States. Mostly all of India shall witness only Partial Lunar Eclipse. Totality begins at 04:58 PM IST and Penumbral eclipse phase ends at 07:53 PM IST.
- Perihelion is when the Earth is closest to the Sun in its orbit, occurring around early January. Aphelion is when the Earth is farthest from the Sun in its orbit, happening around early July, influencing the planet's speed and seasonal variations.

TRAIN YOUR BRAIN

CROSSWORD



Across

4. Which Chinese space station was hosting the affected taikonauts during the orbital debris incident?
7. What type of evolved massive stars generate Apep's dust through colliding winds?
8. Which city was Vainu Bappu born in?
9. Signals from what type of conventional astrophysical objects could mimic dark matter gamma-ray signatures?
10. What type of parachutes used in the IMAT stabilised the module immediately after deployment?

Down

1. Which planned ESA mission, launching in 2031, will provide earlier warnings of solar eruptions from the Sun-Earth L5 point?
2. In which region of the electromagnetic spectrum does MIRI operate?
3. Which recently launched mission contributed to tracking the comet 3I/ATLAS during solar conjunction?
5. What ESA mission mapped over a billion Milky Way stars?
6. Which Olympian god struck Phaëton down to prevent catastrophe?

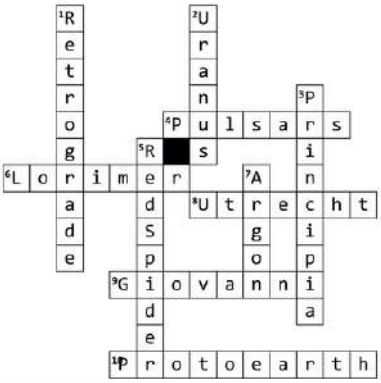
Astronomy Word Puzzle

Space Agencies

K	P	S	K	U	C	A	P	J	S	M	P	O	X
A	T	C	O	X	K	O	A	C	S	P	A	R	E
Z	C	N	S	K	S	X	C	C	O	O	O	S	C
K	O	A	O	O	A	N	P	C	N	R	K	E	A
O	P	P	C	J	P	S	U	A	S	C	M	O	P
S	U	O	K	A	R	C	O	I	S	I	A	R	S
M	O	O	A	S	O	O	N	U	R	I	S	K	E
O	S	A	A	A	N	S	O	A	P	O	N	K	N
S	N	O	O	S	R	U	K	C	C	O	C	O	C
O	S	A	R	O	S	C	O	S	M	O	S	S	A
A	S	N	T	I	O	X	A	U	I	A	C	C	E
I	A	E	U	A	A	C	U	C	U	A	O	S	M
O	A	N	A	S	A	O	S	A	S	E	A	U	O
Z	A	C	S	N	S	O	C	R	A	P	U	S	K

SPACEX
KARI
ROSCOSMOS
CNES
ISRO
NASA
JAXA
UNOOSA
SUPARCO
CNSA
NATA
ESRO
UAESA
COPUOS
KAZKOSMOS

Answers for last month puzzles.



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

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