

Beyond Earth

Class 6 — Science — Chapter 12

NCERT Comprehensive Notes 2025-26

01 Chapter Overview

This chapter, "**Beyond Earth**", takes us on a fascinating journey from the night sky visible to our naked eyes to the vast expanse of the universe. Through the story of Yangdol and Dorjay — twin siblings from Nubra, Ladakh — we explore the beauty of stars, learn about constellations, understand our Solar System, discover the Moon, asteroids, comets, and the Milky Way Galaxy. The chapter also highlights India's contributions to space exploration, including the Chandrayaan missions.

★ USP Key Points

- ★ The sky is officially divided into **88 constellations** by the International Astronomical Union (IAU).
- ★ The **Pole Star (Dhruva Tārā)** appears stationary in the North direction and helps locate North in the Northern Hemisphere.
- ★ **Sirius** is the brightest star in the night sky, located in the constellation Canis Major.
- ★ The Sun is about **100 times bigger** than Earth in diameter and is located about **150 million km** from Earth.
- ★ Our Solar System has **8 planets**, with their moons, asteroids, and comets all revolving around the Sun.
- ★ The Moon is about **3,84,000 km** from Earth and takes about **27 days** to complete one revolution around it.
- ★ India's **Chandrayaan-3** (July 2023) made India the first country to land near the Moon's south pole; **23 August** is now celebrated as **National Space Day**.
- ★ The nearest star to us after the Sun is **Proxima Centauri**, at about **2,69,000 au** from Earth.
- ★ **Halley's Comet** appears every **76 years**; its last appearance was in **1986**.

02 Stars and Constellations

What are Stars?

When we look at the night sky, we see many stars. Some are bright and others are dim. Stars are celestial bodies that **shine with their own light**. They produce heat and light energy through nuclear reactions happening inside them. The Sun is also a star — it is the star closest to us.

Patterns in the Sky — Constellations

Some groups of stars appear to form patterns that look like shapes of familiar objects, animals, or characters. Long ago, our ancestors identified these star patterns and named them based on their own cultural stories. These imaginary shapes helped them recognise stars in the sky easily.

Constellation

In earlier times, groups of stars forming patterns were called constellations. Currently, the regions of sky which include these groups of stars are defined as constellations. The International Astronomical Union (IAU) officially listed **88 constellations** in the early twentieth century, dividing the entire sky into 88 regions.

Use of Star Patterns – Navigation

Recognising stars and their patterns was a very useful skill for **navigation** in olden times. Before the invention of the magnetic compass or modern technology, it helped people — particularly sailors and travellers — find directions at sea or on land. Even today, it is still used in emergencies as a backup method.

Important Constellations and Stars

Orion (The Hunter): This constellation is often represented as a hunter. It has three stars in the middle that represent the belt of the hunter. Some people imagine that the hunter Orion, followed by his dog (Canis Major), is battling a bull (Taurus).

STAR / GROUP	CONSTELLATION	INDIAN NAME (NAKSHATRA)	KEY FACT
Sirius	Canis Major	—	Brightest star in the night sky
Betelgeuse	Orion	Ārdrā	One of the bright stars of Orion
Aldebaran	Taurus	Rohiṇī	A bright star in Taurus
Pleiades (star group)	Taurus	Kṛittikā	A cluster of stars in Taurus
Pole Star (Polaris)	Ursa Minor (Little Dipper)	Dhruva Tārā	Appears stationary in the North

Big Dipper and Little Dipper

The **Big Dipper** and the **Little Dipper** are two distinct patterns of stars easily visible in the night sky. The **Pole Star (Polaris)**, which is part of the Little Dipper, appears stationary in the North direction and helps locate the North direction in the Northern Hemisphere.

Indian Names: The Big Dipper lies in the constellation **Ursa Major** and is known in India as **Saptaṛiṣhi**. The Little Dipper lies in **Ursa Minor**. The Pole Star is known as **Dhruva Tārā**.

Tribal Stories of India: The four stars of the Big Dipper that form a rectangle are viewed by tribes in Central India as the "**grandmother's cot**", with the three remaining stars imagined as thieves stealing it. Fishermen along the Konkan coast see the four stars as a **boat**, with the last three stars as the neck of the boat.

Visibility of Stars

On a clear, cloudless night, a large number of stars may be visible. However, in big cities, the sky is rarely clear and only a few stars are seen due to **light pollution, smoke, and dust**. In villages or areas with less light pollution, many more stars can be seen. Tall buildings and trees near your house can also block your view.

Light Pollution

The presence of excessive artificial light at night time is referred to as light pollution. It reduces our ability to enjoy and study objects in the night sky. Some dark sky reserves and parks have been established around the world to preserve dark skies for research.

Can We See All Stars from Everywhere?

Not all stars and constellations are visible from all places on Earth and on all nights in a year. For example, the Pole Star is **not visible** from the southern hemisphere of Earth. To identify a star or constellation, you need to know how it looks and where to find it in the night sky. Sky mapping apps like **Sky Map** and **Stellarium** can help.

Preparation for Night Sky Watching

★ Tips for Night Sky Watching

- ★ Under adult guidance, identify a dark, open area away from lights, tall buildings, and trees.
- ★ Choose the date and time based upon what you plan to identify.
- ★ Choose a **moonless night** with no clouds, especially for viewing the Pole Star (which is not very bright).
- ★ Have access to a mobile sky map app or printed constellation images. Carry a magnetic compass and notebook.
- ★ After reaching the location, **wait about half an hour** for your eyes to adjust to the darkness.
- ★ **Caution:** Do not go to a dark open place at night without adults accompanying you.

How to Locate the Big Dipper and Pole Star

Look for the Big Dipper during summer in the early night (around 9 p.m.) towards the northern sky. Once you identify it, look at the two stars at the end of its cup and imagine a straight line passing through them towards the north. At about **five times the distance** between these two stars, you will find the Pole Star.

How to Locate Orion and Sirius

In India, Orion is best viewed from **December to April** after sunset. First, identify the three bright stars in a short straight line in the middle (Orion's belt). Then, imagine a straight line through these three stars towards the east — this will lead to Sirius, the brightest star.

Hanle Dark Sky Reserve (HDSR): Located in Ladakh, India, notified in **December 2022**, it is open to the public year-round. The Indian Astronomical Observatory at Hanle sits atop Mount Saraswati and features the **Himalayan Chandra Telescope**, named after Nobel Prize-winning scientist Subrahmanyan Chandrasekhar. Local people are trained as Astronomy Ambassadors to promote astro-tourism.

04 Our Solar System

The Sun – Our Star

The Sun is a star — the star closest to us. It is an extremely hot, spherical ball of gases that gives out a huge amount of energy, making it glow brightly. It is the main source of heat, light, and energy on Earth. The Sun is about **100 times bigger** than Earth in diameter, yet it looks small because it is about **150 million km** away.

Why does the Sun look bigger than other stars? The Sun is much closer to us than other stars, so it appears much bigger. Other stars are much farther away, so they appear like points. During daytime, the Sun's extreme brightness makes it impossible to see other stars.

Astronomical Unit (au)

A unit used for expressing distances within the Solar System. 1 au is approximately equal to the distance between the Sun and the Earth (about 150 million km).

Cultural Importance: The Sun has been worshipped as a deity in most ancient civilizations. In India, it is worshipped as **Sūrya**. The Sun is responsible for climate, seasons, weather, water cycle, and winds — all essential for sustaining life on Earth.

What is a Planet?

A **planet** is a large, nearly spherical object that revolves around the Sun. Our Earth is a planet. The movement of an object around the Sun is called **revolution**. The Earth takes nearly one year to complete one revolution around the Sun.

The Eight Planets

The eight planets, in order of their increasing distance from the Sun, are: **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune**.

PLANET	POSITION	INDIAN NAME	KEY FEATURES
Mercury	1st (closest)	Budha	Smallest inner planet
Venus	2nd	Śhukra	Brightest planet; Morning/Evening Star; hotter than Mercury due to atmosphere
Earth	3rd	Pṛithvī	Blue Planet (water-covered surface); supports life
Mars	4th	Mangala	Red Planet (reddish soil)
Jupiter	5th	Bṛihaspati / Guru	Largest planet; gaseous; has many moons
Saturn	6th	Śhani	Known for prominent rings; gaseous
Uranus	7th	—	Gaseous giant; has rings
Neptune	8th (farthest)	—	Farthest planet; gaseous giant

Inner vs Outer Planets

FEATURE	INNER PLANETS (MERCURY, VENUS, EARTH, MARS)	OUTER PLANETS (JUPITER, SATURN, URANUS, NEPTUNE)
Size	Smaller in size	Much larger compared to Earth
Surface	Solid surfaces with rocks	Mostly made of gases
Rings	No prominent ring systems	Have large flat ring-like structures made of dust and rocky material
Temperature	Generally warmer (closer to Sun)	Generally colder (farther from Sun)

Venus's Temperature Puzzle: Planets farther from the Sun are generally colder. However, Venus is hotter than Mercury, even though it is farther from the Sun. This is because Venus has a thick **atmosphere that traps heat**.

Identifying Planets in the Night Sky

Venus is the easiest planet to identify — it is the **brightest object** in the sky after the Sun and the Moon. Mercury, Mars, Jupiter, and Saturn can also be seen with the naked eye. Unlike stars, **planets do not appear to twinkle** as much. Venus can usually be found near the Eastern direction at dawn or the Western direction at dusk.

Pluto's Story: Pluto was once called the ninth planet. It is smaller than Earth's Moon. When similar small objects were discovered, the IAU in **2006** redefined the requirements for an object to be called a planet. Pluto and similar objects are now classified as **dwarf planets**.

Nearest Star After the Sun: Proxima Centauri is the nearest star after the Sun, located at about **2,69,000 au** — approximately 2,69,000 times the distance from Earth to the Sun.

05 The Moon and Natural Satellites

What are Natural Satellites?

Objects that move around planets are commonly called **satellites**. They are smaller in size than planets. Moons are the **natural satellites** of planets. The Earth has one Moon, Mars has two moons, while Jupiter, Saturn, Uranus, and Neptune have a large number of moons.

Satellite

Any object that moves around a much larger object can be called a satellite. Moons are natural satellites of planets. Even Earth can be considered a satellite of the Sun.

The Moon — Earth's Natural Satellite

The Moon takes about **27 days** to complete one revolution around Earth. It is our nearest neighbour in space, located about **3,84,000 km** away. The Moon is about a **quarter the size** of Earth in diameter. Unlike Earth, there is hardly any atmosphere on the Moon.

Surface of the Moon

The Moon's surface shows circular, bowl-like structures called **craters**. Most of these craters were formed due to the impact of asteroids or rocks from space hitting the Moon's surface. Since there is no atmosphere, water, or life on the Moon, these features stay on its surface for a very long time.

India's Chandrayaan Missions

MISSION	YEAR	OBJECTIVE / ACHIEVEMENT
Chandrayaan-1	2008	India's first mission to the Moon
Chandrayaan-2	2019	Second mission to study the Moon
Chandrayaan-3	July 2023	Vikram lander + Pragyan rover soft-landed on Moon (23 Aug 2023); India became first country to land near Moon's south pole
Chandrayaan-4	Planned	Aims to bring back soil and rock samples from the Moon

National Space Day: To mark the success of Chandrayaan-3's landing near the Moon's south pole on 23 August 2023, the Government of India declared **23 August** to be celebrated as '**National Space Day**'.

06 Asteroids and Comets

Asteroids

There are many small objects in the Solar System that are **rocky and irregular in shape**. These are called **asteroids**. Many of these asteroids revolve around the Sun in paths that lie between the orbits of Mars and Jupiter. This region is called the **asteroid belt**. The sizes of asteroids range from **10 m to about 500 km**. Occasionally, asteroids pass very close to Earth.

Asteroid

Small, rocky, and irregularly shaped objects that revolve around the Sun, mostly found in the asteroid belt between Mars and Jupiter.

Comets

Comets are visitors from the outer regions of the Solar System. They are made up of **dust, gases, rocks, and ice**. When a comet approaches close to the Sun, its frozen material starts evaporating. This evaporating material forms the **tail** of the comet. Comets appear dim as they move away from the Sun and are then not visible to the naked eye.

Halley's Comet is a famous comet that appears every **76 years**. Its last appearance was in **1986**. Many comets revolve around the Sun and approach close to it periodically. Some comets escape the Solar System, while others break up or fall into the Sun or other planets.

Indian Names for Comets: In Sanskrit and some other Indian languages, a comet is called **Dhūmaketu**. Various tribes in India also call it **Pucchya-Taro** (star with a tail) or **Zendya-Taro** (star like a flag). In many ancient cultures, comets were feared and believed to bring bad luck — but science tells us they are simply icy-rocky visitors making a trip close to the Sun!

What Makes Up the Solar System?

The Sun, eight planets, their moons, and many smaller objects including asteroids and comets, together form the Solar System. The Sun is the largest and heaviest object, producing almost all the energy. All other objects shine by reflecting sunlight from their surfaces.

07 The Milky Way Galaxy and the Universe

The Milky Way Galaxy

In the moonless night sky, viewed from dark locations away from city lights, one can see an extended faint band of light stretching from near north to south across the sky. This is our home galaxy called the **Milky Way Galaxy** or **Ākāsha Gangā**. A galaxy contains **millions to billions** of stars. Our Solar System is part of the Milky Way Galaxy.

Galaxy

A huge collection of millions to billions of stars, along with gas, dust, and other celestial objects, held together by gravity. The Milky Way is our home galaxy.

The Universe

Beyond the Milky Way Galaxy, there are **many more galaxies** in outer space. Scientists study them to understand stars, galaxies, and the universe better. The universe contains everything that exists — all galaxies, stars, planets, moons, asteroids, comets, and all matter and energy.

Is There Life Beyond Earth?

We do not know yet if life exists elsewhere in the universe. The search for life has been mostly directed towards **exoplanets** — planets discovered revolving around other stars in our galaxy. Till now, scientists have not found any evidence of life, but the search continues.

Exoplanet

A planet discovered revolving around a star other than our Sun in our galaxy or beyond.

Telescopes — Seeing Beyond the Naked Eye

While many objects in the sky can be seen with naked eyes, we can see them brighter and larger using binoculars or a **telescope**. A telescope also helps view dim objects not visible to the naked eye. Night sky watching events are organised by Higher Education Institutions, Amateur Astronomy Clubs, Museums, and Planetariums across India.

08 Glossary of Key Terms

Star

A celestial body that shines with its own light, producing heat and energy through nuclear reactions. The Sun is a star.

Constellation

A region of the sky containing a group of stars that appear to form a pattern. The IAU has defined 88 constellations.

Pole Star (Polaris)

A star that appears stationary in the North direction, helping to locate North in the Northern Hemisphere. Known as Dhruva Tārā in India.

Planet

A large, nearly spherical object that revolves around the Sun. Our Solar System has eight planets.

Revolution

The movement of an object around the Sun (or another larger object). Earth takes one year for one revolution around the Sun.

Satellite

An object that moves around a planet. Moons are natural satellites. The Moon is Earth's natural satellite.

Asteroid

Small, rocky, irregularly shaped objects revolving around the Sun, mostly found in the asteroid belt between Mars and Jupiter (size: 10 m to ~500 km).

Comet

An icy-rocky object from the outer Solar System that develops a tail when it approaches the Sun due to evaporation of frozen materials. Called Dhūmaketu in Sanskrit.

Galaxy

A massive collection of millions to billions of stars, along with gas and dust. Our home galaxy is the Milky Way (Ākāśha Gangā).

Light Pollution

Excessive artificial light at night that reduces the visibility of stars and other objects in the night sky.

Astronomical Unit (au)

A unit of distance approximately equal to the distance between the Sun and Earth (~150 million km), used for measuring Solar System distances.

Exoplanet

A planet that revolves around a star other than our Sun. Scientists search exoplanets for signs of life.

Crater

A circular, bowl-like structure found on the Moon's surface, formed by the impact of asteroids or rocks from space.

Dwarf Planet

A celestial body smaller than a planet that revolves around the Sun. Pluto was reclassified as a dwarf planet in 2006 by the IAU.

09 Questions, Answers & MCQs

NCERT Exercise Questions with Answers

Q1. Match the columns.

- (i) Satellite of Earth → **(d) Moon**
- (ii) Red Planet → **(c) Mars**
- (iii) Constellation → **(a) Orion**
- (iv) Planet commonly called an evening star → **(b) Venus**

Q2. (i) Solve the riddle: My first alphabet is in MAN but not in CAN; My second alphabet is in ACE and also in FAN; My third alphabet is in RAT and not in CAT; My fourth alphabet is in SUN but not in FUN. I am a planet that moves around the Sun.

First letter: In MAN but not in CAN → **M**
Second letter: In ACE and also in FAN → **A**
Third letter: In RAT but not in CAT → **R**
Fourth letter: In SUN but not in FUN → **S**
The answer is **MARS** — the Red Planet.

Q3. Which of the following is not a member of our Solar System? (i) Sirius (ii) Comets (iii) Asteroids (iv) Pluto

Answer: (i) Sirius

Sirius is a star in the constellation Canis Major and is not a member of our Solar System. Comets, asteroids, and Pluto (a dwarf planet) are all part of our Solar System.

Q4. Which of the following is not a planet of the Sun? (i) Jupiter (ii) Pluto (iii) Neptune (iv) Saturn

Answer: (ii) Pluto

In 2006, the International Astronomical Union (IAU) reclassified Pluto as a dwarf planet because similar small objects were discovered. So Pluto is no longer officially a planet. Jupiter, Neptune, and Saturn are all planets.

Q5. Which is the brighter star, the Pole Star or Sirius?

Sirius is the brighter star. In fact, Sirius is the brightest star in the night sky. The Pole Star (Polaris) is not very bright — it is important because it appears stationary in the North direction and helps in finding the North direction, not because of its brightness.

Q6. An artist's representation of the Solar System is given. Is the order of the planets correct? If not, write the correct order.

The correct order of planets from the Sun outward is:

Mercury → Venus → Earth → Mars → Jupiter → Saturn → Uranus → Neptune

If the order shown in the figure does not match this sequence, students should correct it by writing these names in the correct boxes.

Q9. You can see stars fading away at dawn and appearing at dusk. During the day we do not see the stars. Explain why.

During the daytime, the Sun (which is our nearest star) shines extremely brightly. The brightness of sunlight scattered by Earth's atmosphere makes the sky very bright and blue. This extreme brightness overpowers the faint light from distant stars, making them invisible to our eyes. At dawn, as the Sun rises, its increasing brightness causes the stars to fade. At dusk, as sunlight decreases, the comparatively dim stars gradually become visible again.

Additional Short Answer Questions

Q. What is a constellation? How many constellations are officially recognized?

A constellation is a region of the sky that includes a group of stars appearing to form a recognizable pattern. In earlier times, the term referred to the star patterns themselves. The International Astronomical Union (IAU) has officially recognized **88 constellations**, dividing the entire sky into 88 regions.

Q. Why is Venus hotter than Mercury, even though Mercury is closer to the Sun?

Venus has a very thick atmosphere that traps heat (greenhouse effect), making it extremely hot. Mercury, being closer to the Sun, receives more direct sunlight, but it has almost no atmosphere, so it cannot trap heat effectively. Therefore, Venus ends up being hotter than Mercury.

Q. What are the components of our Solar System?

The Solar System consists of the **Sun** (the largest object and main energy source), **eight planets** (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune), their **moons** (natural satellites), and many smaller objects including **asteroids** (rocky, irregularly shaped objects in the asteroid belt) and **comets** (icy-rocky objects from the outer Solar System). Dwarf planets like Pluto are also part of the Solar System.

Q. What is the significance of the Chandrayaan-3 mission?

Chandrayaan-3 was India's third mission to the Moon, launched in July 2023. Its Vikram lander, carrying the Pragyan rover, successfully soft-landed on the Moon on 23 August 2023. This made India the **first country in the world** to achieve a landing near the Moon's south pole, a region that has been little explored. To celebrate this achievement, the Government of India declared 23 August as 'National Space Day'.

Q. What is light pollution and why is it a concern?

Light pollution refers to the presence of excessive artificial light at night time. It is a growing concern because it reduces our ability to see and study objects in the night sky, disrupts ecosystems, and affects wildlife. To combat this, dark sky reserves like the Hanle Dark Sky Reserve (HDSR) in Ladakh have been established.

Q. How can you locate the Pole Star using the Big Dipper?

First, identify the Big Dipper in the northern part of the night sky. Look at the two stars at the end of the Big Dipper's cup (the side away from the handle). Imagine a straight line passing through these two stars and extend it towards the north. At about five times the distance between these two stars along this line, you will find the Pole Star (Polaris). It is not very bright but appears stationary in the North direction.

Multiple Choice Questions (MCQs)

1. Which is the brightest star in the night sky?

- (a) Pole Star
- (b) Betelgeuse
- (c) Sirius
- (d) Aldebaran

Answer: (c) Sirius

2. Which of the following is not a member of our Solar System?

- (a) Sirius
- (b) Comets
- (c) Asteroids
- (d) Pluto

Answer: (a) Sirius (it is a star in the constellation Canis Major)

3. Which of the following is not a planet of the Sun?

- (a) Jupiter
- (b) Pluto
- (c) Neptune
- (d) Saturn

Answer: (b) Pluto (reclassified as a dwarf planet in 2006)

4. The planet known as the "Red Planet" is:

- (a) Venus
- (b) Jupiter
- (c) Mars
- (d) Saturn

Answer: (c) Mars (its soil is reddish in colour)

5. How many constellations are officially recognized by the IAU?

- (a) 12
- (b) 48
- (c) 88
- (d) 108

Answer: (c) 88

6. The Big Dipper is part of which constellation?

- (a) Orion
- (b) Ursa Major
- (c) Canis Major
- (d) Taurus

Answer: (b) Ursa Major (known as Saptarīṣhi in India)

7. The distance of the Sun from the Earth is approximately:

- (a) 15 million km
- (b) 150 million km
- (c) 1500 million km
- (d) 3,84,000 km

Answer: (b) 150 million km (approximately 1 astronomical unit)

8. Which planet is commonly called the Morning Star or Evening Star?

- (a) Mercury
- (b) Mars
- (c) Venus
- (d) Jupiter

Answer: (c) Venus (it is not actually a star — it is a planet)

9. How long does the Moon take to complete one revolution around the Earth?

- (a) 24 hours

- (b) 27 days
- (c) 365 days
- (d) 76 years

Answer: (b) 27 days

10. Halley's Comet appears every:

- (a) 27 days
- (b) 1 year
- (c) 76 years
- (d) 100 years

Answer: (c) 76 years (last appeared in 1986)

11. The asteroid belt lies between the orbits of which two planets?

- (a) Earth and Mars
- (b) Mars and Jupiter
- (c) Jupiter and Saturn
- (d) Saturn and Uranus

Answer: (b) Mars and Jupiter

12. Which Indian space mission made India the first country to land near the Moon's south pole?

- (a) Chandrayaan-1
- (b) Chandrayaan-2
- (c) Chandrayaan-3
- (d) Mangalyaan

Answer: (c) Chandrayaan-3 (landed on 23 August 2023)

Case-Based Questions

Case Study 1: Night Sky in Ladakh

Yangdol and Dorjay live in Nubra, Ladakh. The weather there is almost cloudless. With almost no air or light pollution, the night sky is very clearly visible. They can see thousands of stars every night and enjoy connecting stars with imaginary lines to make patterns. Their elders told them that particular stars in the clear sky helped caravans in Nubra find directions in ancient days.

1. Why can Yangdol and Dorjay see so many stars at night?
2. What is light pollution?
3. How did stars help ancient caravans in navigation?
4. Name one dark sky reserve established in India.

Answers:

1. They can see many stars because Nubra has almost cloudless weather and very little air or light pollution, making the night sky very clearly visible.
2. Light pollution is the presence of excessive artificial light at night time, which reduces our ability to see stars and other celestial objects.
3. Stars formed recognizable patterns (constellations) that were used by ancient caravans, sailors, and travellers to determine directions during their journeys, before the invention of the magnetic compass.
4. The Hanle Dark Sky Reserve (HDSR) in Ladakh, notified in December 2022.

Case Study 2: India's Moon Missions

India's space agency ISRO has launched several missions to study the Moon. Chandrayaan-1 was launched in 2008, followed by Chandrayaan-2 in 2019. The third mission, Chandrayaan-3, was launched in July 2023. Its Vikram lander carrying the Pragyan rover successfully soft-landed on the Moon on 23 August 2023 near the Moon's south pole — a region that had been little explored.

1. What was special about the Chandrayaan-3 landing?
2. What was the name of the lander and rover in Chandrayaan-3?
3. Which day is celebrated as National Space Day and why?
4. What is the aim of the planned Chandrayaan-4 mission?

Answers:

1. Chandrayaan-3 made India the first country in the world to achieve a landing near the Moon's south pole, a region little explored previously.
2. The lander was named **Vikram** and the rover was named **Pragyan**.
3. **23 August** is celebrated as National Space Day, to mark the successful landing of Chandrayaan-3 on the Moon on that date in 2023.
4. Chandrayaan-4 aims to bring back soil and rock samples from the Moon to Earth.

Case Study 3: The Solar System and Planets

Our Solar System consists of the Sun at the centre, eight planets revolving around it, their moons, and many smaller objects like asteroids and comets. The inner four planets — Mercury, Venus, Earth, and Mars — are smaller and have solid, rocky surfaces. The four outer planets — Jupiter, Saturn, Uranus, and Neptune — are much larger and are mostly made of gases, with flat ring-like structures around them. Interestingly, Venus is hotter than Mercury despite being farther from the Sun.

1. Name the eight planets in order of their distance from the Sun.
2. How are the inner planets different from the outer planets?
3. Why is Venus hotter than Mercury?
4. Which planet is called the Blue Planet and why?











Answers:

1. Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.
2. Inner planets are smaller with solid, rocky surfaces, while outer planets are much larger and mostly


gaseous, with large ring-like structures around them.

3. Venus has a thick atmosphere that traps heat (greenhouse effect), making it hotter than Mercury, which has almost no atmosphere to retain heat.
4. Earth is called the Blue Planet because a large portion of its surface is covered with water, making it appear blue from space.

Exam Tips — Beyond Earth

-  Memorize the order of 8 planets using the mnemonic: **My Very Educated Mother Just Showed Us Neptune** (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune).
-  Remember the key numbers: Sun–Earth distance = **150 million km (1 au)**; Moon–Earth distance = **3,84,000 km**; Moon's revolution = **27 days**; Earth's revolution = **1 year**.
-  Know the difference between **star** (produces own light) and **planet** (reflects sunlight; doesn't twinkle much).
-  Important Indian names: Big Dipper = **Saptaṛiṣhi**; Pole Star = **Dhruva Tārā**; Comet = **Dhūmaketu**; Sun = **Sūrya**.
-  Pluto was reclassified as a **dwarf planet** in **2006** by IAU — this is a common MCQ question.
-  Venus is called the **Morning/Evening Star** but is actually a planet. It is the **brightest object** after the Sun and Moon.
-  Learn all **4 Chandrayaan missions**: years, achievements, and the significance of 23 August (National Space Day).
-  Understand inner vs outer planets: inner = small, rocky, solid; outer = large, gaseous, ringed.
-  Asteroid belt location: **between Mars and Jupiter**. Size range: **10 m to ~500 km**.
-  For diagram-based questions, practice drawing the Solar System planet order and the Big Dipper → Pole Star method.

UNIQUE STUDY POINT

Prepared by **Sumeet Sahu** | Amitesh Nagar, Indore (M.P.)
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