

UNIQUE STUDY POINT

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Class: VI	Subject: Science	Session: 2025-26
Chapter: 12 - Beyond Earth	Time: 1½ Hours	Max. Marks: 40

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five sections A, B, C, D and E.
3. Section A contains 10 MCQs of 1 mark each.
4. Section B contains 4 questions of 2 marks each.
5. Section C contains 3 questions of 3 marks each.
6. Section D contains 1 question of 5 marks.
7. Section E contains 2 Case Study Based questions of 4 marks each.

SECTION A - Multiple Choice Questions (1 mark each)

- Q1.** The Sun is approximately how many times bigger than Earth in diameter?
- (a) 10 times
 - (b) 50 times
 - (c) 100 times
 - (d) 1000 times
- Q2.** Which of the following is an example of a natural satellite?
- (a) International Space Station
 - (b) Moon
 - (c) Hubble Telescope
 - (d) GPS Satellite
- Q3.** The asteroid belt is located between which two planets?
- (a) Earth and Mars
 - (b) Mars and Jupiter
 - (c) Jupiter and Saturn
 - (d) Saturn and Uranus
- Q4.** What is the term used for the movement of an object around the Sun?
- (a) Rotation
 - (b) Revolution
 - (c) Oscillation
 - (d) Vibration
- Q5.** Earth is also called the "Blue Planet" because:
- (a) It has blue soil
 - (b) A large portion of its surface is covered with water

- (c) Its atmosphere is blue
- (d) It reflects blue light from the Sun

Q6. In Indian astronomy, which nakṣatra refers to the star Betelgeuse in Orion?

- (a) Rohiṇī
- (b) Ārdrā
- (c) Krittikā
- (d) Bharanī

Q7. Pluto is now classified as a:

- (a) Planet
- (b) Dwarf planet
- (c) Asteroid
- (d) Comet

Q8. The constellation Orion is best viewed in India during which months?

- (a) June to September
- (b) September to November
- (c) December to April
- (d) May to August

Q9. What is the approximate distance of the Sun from Earth in astronomical units (au)?

- (a) 0.5 au
- (b) 1 au
- (c) 2 au
- (d) 5 au

Q10. How many constellations are officially recognized by the International Astronomical Union (IAU)?

- (a) 48
- (b) 66
- (c) 88
- (d) 100

SECTION B - Short Answer Questions (2 marks each)

Q11. What is an astronomical unit (au)? Why is it useful?

Q12. Why do we not see stars during daytime?

Q13. Name the Big Dipper in Indian astronomy. In which constellation does it lie?

Q14. What are asteroids? Where are most asteroids found in our Solar System?

SECTION C - Short Answer Questions (3 marks each)

Q15. Describe the preparation needed for night sky watching. List at least four important points.

Q16. Write about the Sun as a source of energy. Why is it important for life on Earth?

Q17. How did constellations help people in navigation in ancient times? Explain with an example.

SECTION D - Long Answer Question (5 marks)

Q18. Describe our Solar System in detail. In your answer, include:

- (i) The components of the Solar System
- (ii) The order of planets from the Sun
- (iii) The role of the Sun
- (iv) The difference between natural and artificial satellites
- (v) Other objects in the Solar System

SECTION E - Case Study Based Questions (4 marks each)

Q19. Case Study 1: The International Astronomical Union

In the early twentieth century, different cultures used different names and boundaries for constellations, which created confusion. To solve this problem, the International Astronomical Union (IAU) defined an internationally agreed set of constellation boundaries. In 1930, the IAU officially listed 88 constellations, dividing the entire sky into 88 regions. These regions of sky are now defined as constellations. In 2006, the IAU also redefined what qualifies as a planet, leading to Pluto being reclassified as a dwarf planet.

Based on the above passage, answer the following questions:

- (a) When were the 88 constellations officially listed? (1 mark)
- (b) What is the current definition of a constellation? (1 mark)
- (c) What happened to Pluto's classification in 2006? (1 mark)
- (d) Why was it necessary to have internationally agreed constellation boundaries? (1 mark)

Q20. Case Study 2: Hanle Dark Sky Reserve

The Indian Institute of Astrophysics operates the Indian Astronomical Observatory in Hanle, Ladakh. It is situated atop Mount Saraswati, the highest peak of the Digpa-ratsa-Ri mountain range. The area surrounding this observatory was notified as the Hanle Dark Sky Reserve (HDSR) in December 2022. This reserve is one of the world's highest-altitude observatories and is open to the public throughout the year. Local people have been provided with small telescopes and trained to be Astronomy Ambassadors for visitors. The reserve is expected to promote astro-tourism in the region while preserving dark skies for research.

Based on the above passage, answer the following questions:

- (a) Where is the Indian Astronomical Observatory located? (1 mark)
- (b) When was the Hanle Dark Sky Reserve notified? (1 mark)
- (c) What role do local people play in the HDSR? (1 mark)
- (d) Why are dark sky reserves important? (1 mark)

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SECTION A - Answers to MCQs

Ans 1. (c) 100 times

The Sun is about 100 times bigger than Earth in diameter, which makes it appear much larger despite being very far away.

Ans 2. (b) Moon

The Moon is Earth's natural satellite. Natural satellites are celestial bodies that naturally orbit planets, unlike artificial satellites created by humans.

Ans 3. (b) Mars and Jupiter

The asteroid belt is located between Mars and Jupiter, containing many rocky objects of various sizes revolving around the Sun.

Ans 4. (b) Revolution

The movement of an object around the Sun (or any central body) is called revolution. For example, Earth revolves around the Sun in one year.

Ans 5. (b) A large portion of its surface is covered with water

Earth is called the Blue Planet because about 71% of its surface is covered with water, making it appear blue from space.

Ans 6. (b) Ārdrā

In Indian astronomy, the star Betelgeuse in the Orion constellation is known as Ārdrā.

Ans 7. (b) Dwarf planet

Pluto is now classified as a dwarf planet after the IAU redefined the requirements for an object to be called a planet in 2006.

Ans 8. (c) December to April

In India, the constellation Orion is best viewed during the months of December to April after sunset.

Ans 9. (b) 1 au

By definition, 1 astronomical unit (au) is approximately the distance between the Sun and Earth, which is about 150 million km.

Ans 10. (c) 88

The International Astronomical Union (IAU) officially recognizes 88 constellations, which divide the entire sky into 88 regions.

SECTION B - Answers to Short Answer Questions

Ans 11. What is an astronomical unit (au)? Why is it useful?

Astronomical Unit (au): An astronomical unit is a unit of distance used in astronomy. It is approximately equal to the distance between the Sun and Earth, which is about 150 million km.

Why it is useful:

- (i) It provides a convenient way to express very large distances within the Solar System
- (ii) Instead of using millions of kilometers, astronomers can use smaller numbers in au
- (iii) For example, Mars is about 1.5 au from the Sun, which is easier to understand than 228 million km

Ans 12. Why do we not see stars during daytime?

We do not see stars during daytime because of the extreme brightness of the Sun. During the day, the Sun's intense light illuminates the Earth's atmosphere, creating bright daylight that overwhelms the much dimmer light from distant stars. The stars are still present in the sky, but their light is not visible to our eyes due to the bright background created by sunlight scattering in the atmosphere.

Ans 13. Name the Big Dipper in Indian astronomy. In which constellation does it lie?

Indian Name: In India, the Big Dipper is known as **Saptarishi** (meaning seven sages).

Constellation: The Big Dipper lies in the constellation **Ursa Major**.

Note: The Big Dipper is a prominent pattern of seven stars that is easily recognizable in the northern sky.

Ans 14. What are asteroids? Where are most asteroids found in our Solar System?

Asteroids: Asteroids are small objects in the Solar System that are rocky and irregular in shape. They are much smaller than planets and range in size from about 10 meters to about 500 km.

Location: Most asteroids in our Solar System are found in the **asteroid belt**, which is located between the orbits of Mars and Jupiter. Many asteroids revolve around the Sun in this region.

SECTION C - Answers to Short Answer Questions

Ans 15. Describe the preparation needed for night sky watching. List at least four important points.

Preparation for night sky watching:

1. **Location Selection:** Under the guidance of adults, identify a dark open area away from lights, tall buildings, and trees for clear viewing of the night sky.
2. **Date and Time:** Choose the date and time based on what you plan to observe. For example, select a moonless night for viewing dim stars like the Pole Star.
3. **Weather Conditions:** Choose a clear night with no clouds for best visibility of stars and constellations.
4. **Tools and Resources:** Carry helpful resources such as:
 - Mobile app with sky maps for identifying constellations
 - Magnetic compass for finding directions
 - Notebook for drawing observations
 - Printed images of constellations you plan to view
5. **Eye Adjustment:** After reaching the observation site, wait for about 30 minutes to allow your eyes to adjust to the darkness. This significantly improves your ability to see dim stars.
6. **Safety:** Never go to a dark open place at night without adults accompanying you for safety.

Ans 16. Write about the Sun as a source of energy. Why is it important for life on Earth?

The Sun as a Source of Energy:

The Sun is a star that produces an enormous amount of energy through nuclear reactions in its core. It is an extremely hot spherical ball of gases that gives out heat and light continuously.

Importance for Life on Earth:

1. **Temperature Regulation:** The heat provided by the Sun maintains Earth at a temperature range that makes life possible. Without the Sun's warmth, Earth would be too cold to support life.
2. **Photosynthesis:** Sunlight is essential for plants to perform photosynthesis, through which they produce food and oxygen. Plants form the base of the food chain, providing sustenance for all other living organisms.
3. **Climate and Weather:** The Sun is responsible for Earth's climate patterns, seasons, and weather phenomena. It drives the water cycle, winds, and ocean currents.
4. **Energy Source:** The Sun is the ultimate source of almost all energy on Earth, including fossil fuels which are formed from ancient plant and animal matter that originally derived energy from sunlight.

In summary, without the Sun, life as we know it could not exist on Earth.

Ans 17. How did constellations help people in navigation in ancient times? Explain with an example.

Constellations in Ancient Navigation:

Before the invention of modern technology like GPS or even the magnetic compass, people relied on observations of stars and constellations to find directions, especially at sea or when traveling across unfamiliar land.

How they helped:

- (i) Star patterns were recognizable and consistent, making them reliable reference points
- (ii) Certain stars and constellations always appeared in specific directions
- (iii) Sailors and travelers memorized these patterns to navigate during nighttime
- (iv) This knowledge was particularly useful for long sea voyages where there were no landmarks

Example - Using the Pole Star:

The best example is the use of the Pole Star (Polaris) for navigation in the Northern hemisphere. The Pole Star always appears in the North direction and remains stationary throughout the night. Ancient travelers and sailors would:

- First locate the Big Dipper (Saptarīṣhi)
- Use the two pointer stars at the end of the Big Dipper's cup
- Follow an imaginary line through these stars to find the Pole Star
- Once they found the Pole Star, they knew which direction was North
- From North, they could determine all other directions (South, East, West)

This method was used extensively by sailors, merchants traveling along trade routes (like the Silk Road), and caravans crossing deserts. Even today, it is taught as a backup navigation method in case modern technology fails.

Ans 18. Describe our Solar System in detail.

OUR SOLAR SYSTEM

(i) Components of the Solar System:

Our Solar System consists of:

- The Sun (our star at the center)
- Eight planets
- Natural satellites (moons) of planets
- Asteroids
- Comets
- Dwarf planets (like Pluto)
- Dust and gas particles

All these objects together form the Solar System, with most objects revolving around the Sun.

(ii) Order of Planets from the Sun:

The eight planets in order of increasing distance from the Sun are:

1. **Mercury** - Closest to the Sun
2. **Venus** - Known as Morning/Evening Star
3. **Earth** - Our home planet (Blue Planet)
4. **Mars** - The Red Planet
5. **Jupiter** - Largest planet
6. **Saturn** - Planet with prominent rings
7. **Uranus** - Ice giant
8. **Neptune** - Farthest planet from Sun

The first four (Mercury, Venus, Earth, Mars) are inner planets, while the last four (Jupiter, Saturn, Uranus, Neptune) are outer planets.

(iii) Role of the Sun:

- The Sun is the largest and heaviest object in the Solar System
- It produces almost all the energy in the Solar System through nuclear reactions
- All other objects shine by reflecting sunlight from their surfaces
- The Sun's gravitational pull keeps all objects in orbit around it
- It provides heat and light essential for life on Earth
- The Sun is responsible for climate, seasons, and weather on Earth

(iv) Difference between Natural and Artificial Satellites:

Natural Satellites	Artificial Satellites
Occur naturally in space	Made and launched by humans
Examples: Moon, moons of other planets	Examples: GPS satellites, communication satellites, ISS
Have been orbiting for millions/billions of years	Launched in recent decades for specific purposes

(v) Other Objects in the Solar System:

Asteroids: Small rocky objects, mostly found in the asteroid belt between Mars and Jupiter. Sizes range from 10 meters to about 500 km.

Comets: Objects made of dust, gases, rocks, and ice that come from outer regions of the Solar System. When they approach the Sun, frozen material evaporates forming a characteristic long tail. Example: Halley's Comet.

Dwarf Planets: Small planet-like objects that don't meet all criteria to be called planets. Pluto is the most famous dwarf planet.

The Solar System is vast, with the farthest planet Neptune being about 30 times farther from the Sun than Earth.

SECTION E - Answers to Case Study Based Questions

Ans 19. Case Study 1: The International Astronomical Union

(a) When were the 88 constellations officially listed?

The 88 constellations were officially listed in 1930 by the International Astronomical Union (IAU), though the boundaries were defined in the early twentieth century.

(b) What is the current definition of a constellation?

Currently, constellations are defined as regions of the sky. While earlier they referred to groups of stars forming patterns, now the entire regions of sky that include these star groups are defined as constellations. The sky is divided into 88 such regions.

(c) What happened to Pluto's classification in 2006?

In 2006, the International Astronomical Union (IAU) redefined the requirements for an object to be called a planet. As per this new definition, Pluto was reclassified from a planet to a dwarf planet because it did not meet all the criteria.

(d) Why was it necessary to have internationally agreed constellation boundaries?

It was necessary to have internationally agreed constellation boundaries because:

- (i) Different cultures had different names and boundaries for constellations, causing confusion
- (ii) A standardized system was needed for effective communication among astronomers worldwide
- (iii) It helped create consistency in astronomical observations and research
- (iv) It facilitated better cataloging and identification of celestial objects

Ans 20. Case Study 2: Hanle Dark Sky Reserve

(a) Where is the Indian Astronomical Observatory located?

The Indian Astronomical Observatory is located in Hanle, Ladakh, atop Mount Saraswati, which is the highest peak of the Digpa-ratsa-Ri mountain range.

(b) When was the Hanle Dark Sky Reserve notified?

The Hanle Dark Sky Reserve (HDSR) was notified in December 2022.

(c) What role do local people play in the HDSR?

Local people play an important role in the Hanle Dark Sky Reserve. They have been:

- (i) Provided with small telescopes by the Indian Institute of Astrophysics
- (ii) Trained to be Astronomy Ambassadors for visitors

- (iii) Enabled to help tourists and visitors with sky observation
- (iv) Made active participants in promoting astro-tourism in the region

(d) Why are dark sky reserves important?

Dark sky reserves are important because:

- (i) They control light pollution, preserving dark skies for astronomical research
- (ii) Light pollution is growing globally, making dark areas increasingly rare
- (iii) They provide ideal conditions for studying celestial objects clearly
- (iv) They help educate people about reducing light pollution
- (v) They promote astro-tourism while maintaining scientific research facilities
- (vi) They preserve our ability to enjoy and study the night sky for future generations

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