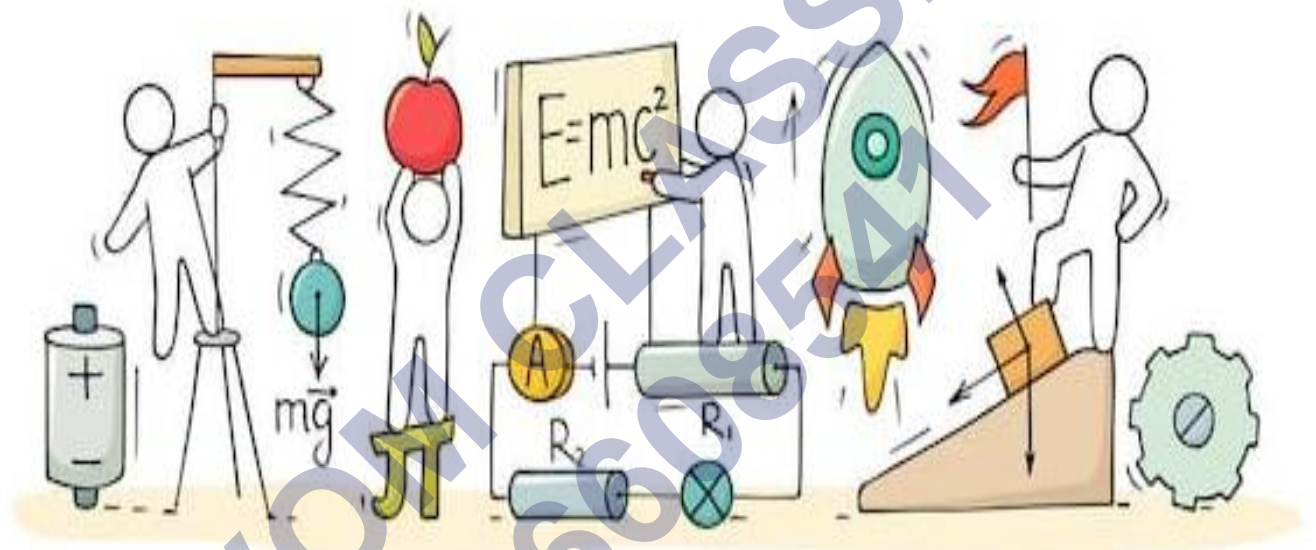


# SCIENCE

## Chapter 17: Stars and the Solar System



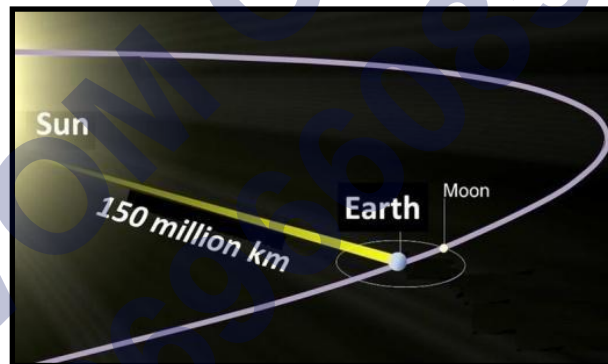
## Stars and the Solar System

- The stars, planets, the Moon and the other objects which we see in the sky are called celestial bodies.

### The Stars

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- When we see the dark sky at night, we see many stars shining brighter than the others.
- Stars are bodies which emit their own light.
- They are also present in the sky during the day time, but they are not visible because of the bright sunlight.
- The Sun is also a star.
- The star nearest to the Earth is the Sun, which is the source of most of the energy on the Earth.
- Stars appear to move from east to west as Earth rotates from west to east.
- The Sun, being a star, appears to rise in the east and set in the west.



- The huge distances between the Earth and other celestial bodies are measured in light years.
- A light year is the distance covered by light in one year.
- The Pole star is situated in the direction of the Earth's axis, and hence, it does not appear to move.

### Constellations

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- The stars which form a group which has a recognisable shape of an identifiable object like an animal or a known object is called a constellation.



- To identify the stars, constellations were given their names many hundreds of years ago.
- We use constellations to divide the sky because they move so slowly that in our lifetime, they will always be found in about the same place.
- The stars contained in a constellation are not at the same distance. They just appear at the same line of sight.
- Orion (appears like a human figure with a belt, often referred to as 'The Hunter')
  - ✓ It can be seen in the late evenings during winter.
  - ✓ The belt with three bright stars in a row is usually the easiest part of Orion to spot.
  - ✓ It has seven or eight bright stars. The two brightest are Betelgeuse (shoulder) and Rigel (foot).

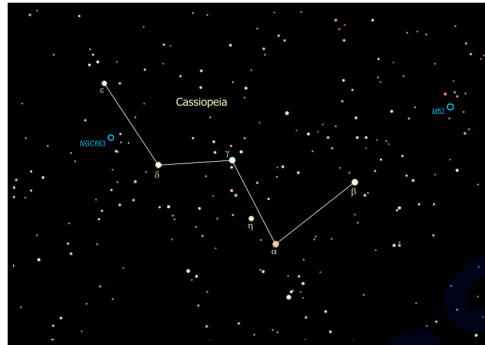


- ✓ The brightest star Sirius is located close to Orion.
- Ursa Major (Big Dipper, Great Bear, Saptarshi)
  - ✓ It can be seen at night in the summer sky.



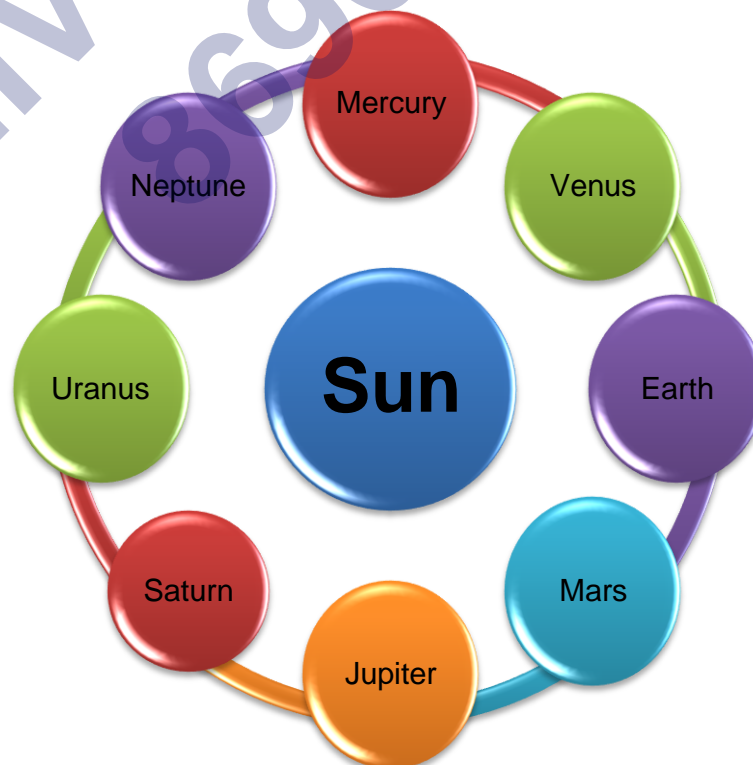
- ✓ It has seven prominent stars and appears like a big ladle or a question mark.
- ✓ There are three stars in the handle of the ladle and four in its bowl.

- Cassiopeia
  - ✓ Cassiopeia is a prominent constellation in the northern sky.
  - ✓ It is visible during winter in the early part of the night.
  - ✓ It looks like a distorted letter 'W' or 'M'.



## The Solar System

- The Sun and the celestial bodies which revolve around it form the Solar System.
- The Sun is a major source of heat and light for all the planets in the Solar System.
- The Solar System consists of a large number of bodies such as planets, comets, asteroids and meteors.
- The gravitational attraction between the Sun and these objects keeps them revolving around it.
- Earth is the only planet on which life is known to exist.
- There are eight planets which revolve around the Sun.



## The Sun

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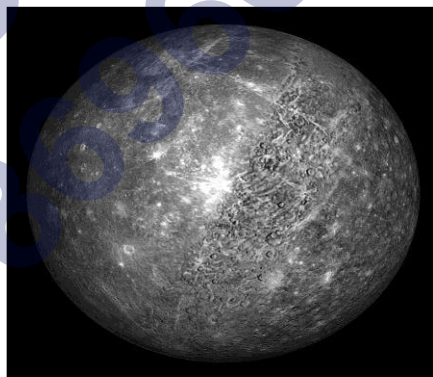
- The Sun is the nearest star from us.
- It is of average size, mass and brightness. Therefore, it appears bigger, brighter and hotter than other stars.
- It is continuously emitting huge amounts of heat and light.
- Light from the Sun reaches the Earth in approximately 8 minutes and 20 seconds.
- Its distance from the Earth is about  $1.49 \times 10^8$  km.

## The Planets

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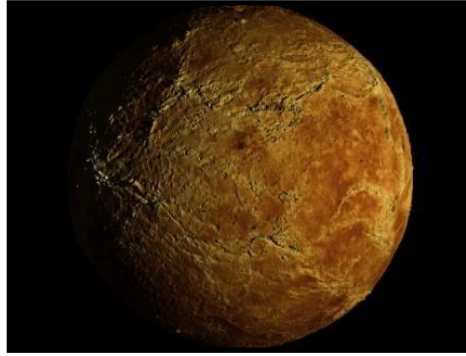
- The planets look like stars, but they do not have light of their own. They reflect sunlight which is incident on them.
- They have definite paths called orbits in which they revolve around the Sun.
- The time taken by a planet to complete one full revolution around the Sun is called its period of revolution.
- The time taken by a planet to rotate a full  $360^\circ$  on its axis is called its period of rotation.
- A celestial body which revolves around another celestial body is called a satellite. Some planets have their own satellites.

### Mercury (Budh)



- It is the smallest planet in the Solar System and the closest to the Sun.
- It takes about 88 days to complete one revolution around the Sun.
- Mercury has no satellite of its own.

## Venus (Shukra)



- The second closest planet to the Sun.
- It takes about 225 days to complete one revolution around the Sun.
- It has no satellite of its own.
- It rotates from east to west.
- It appears in the eastern sky before sunrise and in the western sky after sunset. So, it is also called morning or evening star.
- Venus also shows phases just like our Moon.

## Earth (Prithvi)

- It is the only planet to support life in the Solar System.
- This is because
  - ✓ It is at the right distance from the Sun, so its temperature range is ideal for life to exist.
  - ✓ It has presence of liquid water.
  - ✓ It has an atmosphere.
- Earth appears blue-green from space.
- It has one Moon.

## Mars (Mangal)

- It is the first planet outside the orbit of the Earth.
- It completes one revolution around the Sun in about 687 days.
- It has two moons (natural satellites) of its own.
- It appears slightly reddish and is therefore called the red planet.



### Jupiter (Brihaspati)

- It is the largest planet in the Solar System.



- It is so large that about 1300 earths can be placed inside this giant planet.
- It rotates the fastest among all planets.
- The mass of Jupiter is about 318 times that of the Earth.
- It has many moons. However, the four largest moons are called Io, Europa, Calisto and Ganymede.
- It also has a very faint ring.

### Saturn (Shani)

- Saturn is yellowish and is the second largest planet.



- The rings of Saturn are made of ice particles and dust.
- It is the only planet which is lighter than water.
- The largest of Saturn's moons is Titan.

### Uranus

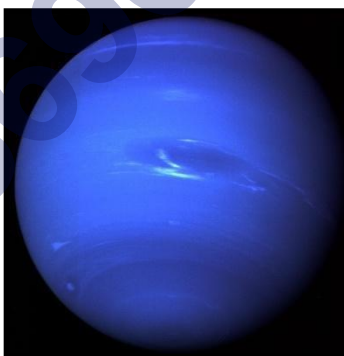
- It is a very cold planet and is much bigger than the Earth.



- It has 27 natural satellites.
- It also rotates from east to west.

### Neptune

- It is very far away from the Sun, and it is very cold.
- It looks like a small bluish circle through a powerful telescope.



- It was discovered through mathematical calculation.
- Mercury, Venus, Earth and Mars are called the inner planets. Jupiter, Saturn, Uranus and Neptune are called the outer planets.
- The outer planets have several moons and a system of rings.

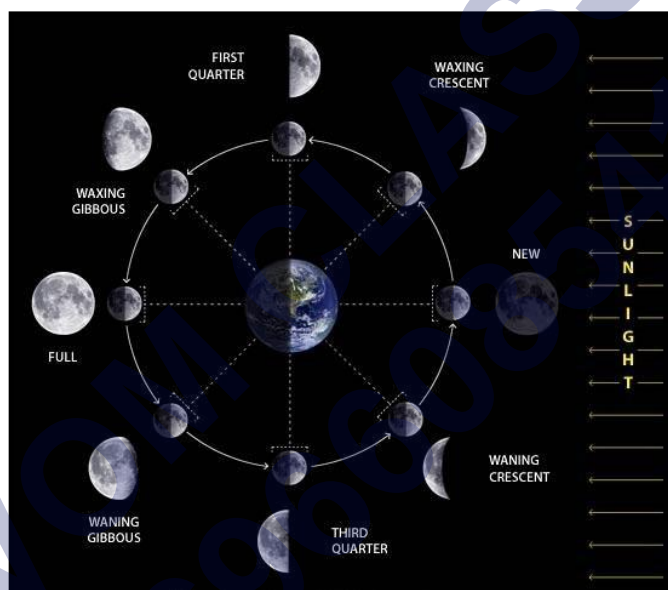
### The Moon



- The Moon is the brightest object in the night sky.
- It is the only natural satellite of Earth and the fifth largest satellite in the Solar System.
- The average centre-to-centre distance from the Earth to the Moon is 384,000 km, about thirty times the diameter of the Earth.
- The various shapes of the bright part of the Moon seen during a month are called the phases of the Moon.

### Phases of the Moon

- We see parts of the Moon on different days because the Moon does not produce its own light.
- We see only that part of the Moon from which the light of the Sun is reflected towards us.



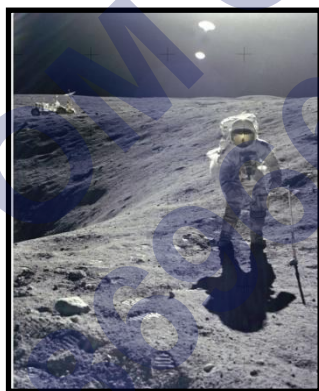
- **Full Moon Day**
  - ✓ The day on which the whole disc of the Moon is visible is known as a Full Moon day.
  - ✓ Thereafter, every night, the size of the bright part of the Moon appears to become thinner and thinner.
- **New Moon Day**
  - ✓ On the fifteenth day after the Full Moon, the Moon is not visible. This day is known as the New Moon day.
- **Crescent Moon**
  - ✓ The small portion of the Moon which appears in the sky is known as the crescent Moon.
  - ✓ The Moon grows larger every after the New Moon and again on the fifteenth day, we see the full view of the Moon.
- The Moon completes one rotation on its axis as it completes one revolution around the Earth.

### The Moon's Surface

- The Moon's surface is dusty and barren.



- The surface has many craters of different sizes.
- It has a large number of steep and high mountains and some of these are as high as the highest mountains on the Earth.
- It has no atmosphere and no water.
- The first man to land on the surface of the Moon was American astronaut Neil Armstrong who landed on 21 July 1969, and he was followed by Edwin Aldrin.



## Other Members of the Solar System

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- Apart from the Sun and the planets, the Solar System also consists of celestial bodies such as asteroids, meteors, comets and artificial satellites.

Asteroids

Comets

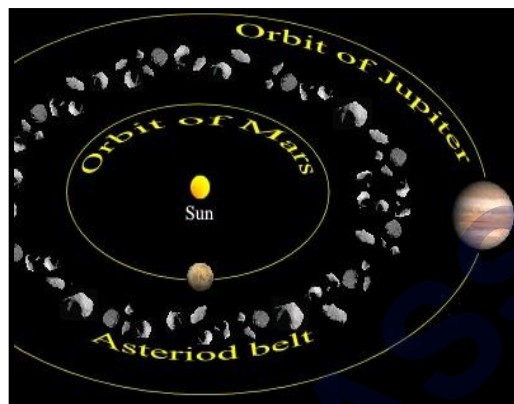
Meteors and Meteorites

Artificial satellites

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### Asteroids

- These are large pieces of rock or rock and metal.
- They are found in the gap between the orbits of Mars and Jupiter.
- This gap is called the Asteroid belt.



- They can only be seen through large telescopes.

### Comets

- A comet is a luminous heavenly body which revolves around the Sun in an elliptical orbit.
- It appears generally as a bright head with a long tail.
- When it is close to the Sun, its nucleus—which consists of frozen gases, ice and dust—melts and emits a large amount of gas and dust.



- The tail of a comet is always directed away from the Sun.
- One of the best known comets is the Halley's Comet, which appears after nearly every 76 years.
- It is named after Edmund Halley and was last seen in 1986.

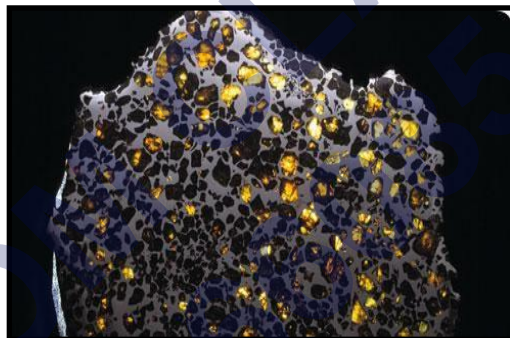
### Meteors and Meteorites

- A meteor is made of debris.

- It enters the Earth's atmosphere at a very high speed.



- The friction with the atmosphere makes the meteor hot and it burns till it disintegrates.
- As it falls to the ground, it glows brightly. This is why it is called a shooting star.
- Some meteors reach the ground before burning completely and evaporating. These are called meteorites.



- They help scientists in investigating the nature of the material from which the Solar System was formed.
- When the Earth crosses the tail of a comet, swarms of meteors are seen. These are known as meteor showers.

### Artificial Satellites

- Artificial satellites are man-made devices which orbit the Earth, Moon and Sun.
- They are launched from the Earth and they revolve around it much closer than the Moon.
- They gather information about the bodies they orbit.

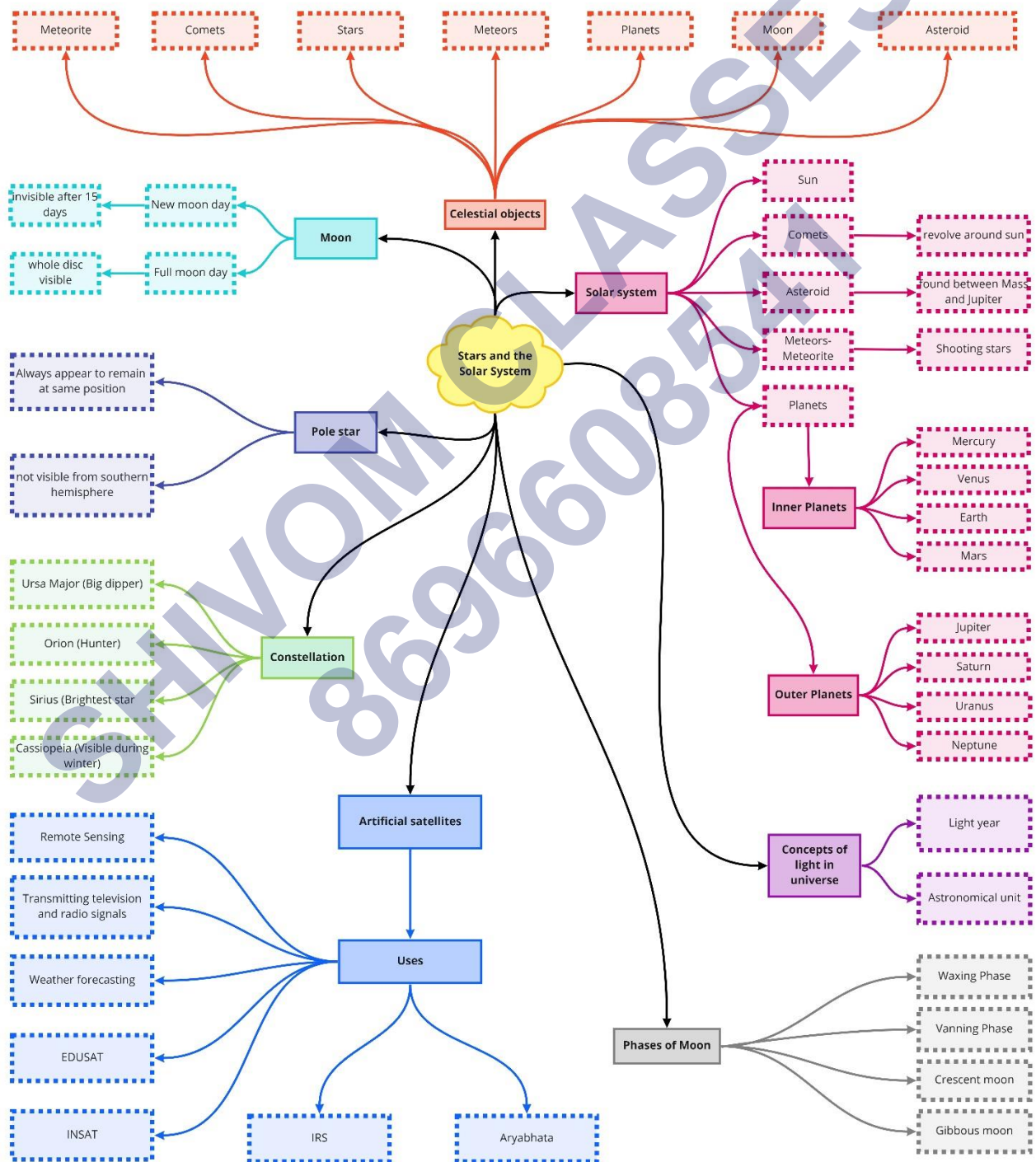


- There are about 5,000 artificial satellites orbiting the Earth.
- They are used for transmission of television and radio signals, telecommunications, weather forecasting and remote sensing.
- India has built and launched several artificial satellites.
- Aryabhata was the first Indian satellite.



- The other Indian satellites are INSAT, IRS, Kalpana-1 and EDUSAT.

Class : 8th Science  
Chapter 17 Stars and the Solar System



## Important Questions

### Multiple Choice questions-

Question 1. Which of the following does not belong to the family of solar system?

- (a) Planet
- (b) Galaxy
- (c) Meteors
- (d) Comet

Question 2. The Halley's Comet is seen after every

- (a) 76 months
- (b) 76 years
- (c) 56 months
- (d) 56 years

Question 3. Ursa Major is a

- (a) star
- (b) constellation
- (c) seen only with telescope
- (d) satellite

Question 4. Which planet has the largest number of satellites?

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

Question 5. Which unit is used to measure astronomical distances?

- (a) Leap year
- (b) Light year
- (c) Century
- (d) Sound year



Question 6. The stars forming a recognizable shape is called

- (a) constellation
- (b) system
- (c) galaxy
- (d) asteroids

Question 7. Which star is nearest to Earth?

- (a) Pole star
- (c) Orion
- (b) Cassiopeia
- (d) Sun

Question 8. What term is used for celestial bodies that revolve around the Sun in highly elliptical orbit?

- (a) Comet
- (b) Meteors
- (c) Asteroids
- (d) Planets

Question 9. Which small objects revolve between the orbits of Mars and Jupiter?

- (a) Satellites
- (b) Comets
- (c) Asteroids
- (d) Meteorites

Question 10. Which planet is called morning star or evening star?

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

Question 11. Our galaxy is known as

- (a) Earth galaxy

- (b) Sun galaxy
- (c) Milky Way
- (d) Constellation

Question 12. Which of the following is not a planet?

- (a) Mercury
- (b) Saturn
- (c) Jupiter
- (d) Great bear

Question 13. Orion is a

- (a) constellation
- (b) star
- (c) planet
- (d) satellite

Question 14. Shooting stars are called

- (a) asteroids
- (b) galaxies
- (c) meteors
- (d) andromeda

Question 15. The planet farthest from the Sun is

- (a) Uranus
- (b) Neptune
- (c) Saturn
- (d) Mercury

### Very Short Questions :

1. Name the planet appears in the northern sky before sunrise?
2. Name the planet which has 28 moons?
3. In which direction stars move except Polar star?
4. Why pole star appears stationary?

5. Which two planets have asteroids between them?
6. Which comet visits the earth after 76 years?
7. What happens to meteors when enters the earth's atmosphere?
8. What is the high tog geostationary satellite from the earth surface?
9. What does term INSAT mean?
10. Name the first Indian satellite launched successfully.

### Short Questions :

1. What do you mean by celestial objects. Explain with examples?
2. Why can't we hear any kind of sound on moon?
3. Define the following:
  - (a) Moon
  - (b) Stars
4. Differentiate between planet and stars.
5. Differentiate between moon and stars.
6. Name the person who landed on the moon for the first time along with the date at which he landed there for the first time.
7. Write some characteristics of stars.
8. Why we are not able to see the stars during the day time?
9. Why stars appear to move from east to west?
10. Define constellation along with some examples.

### Long Questions :

1. What is the solar system? Explain.
2. What makes life possible on planet Earth?
3. Differentiate between the following:
  - (a) Star and planet
  - (b) Asteroid and comet
  - (c) Meteoroid and comet
  - (d) Galaxy and constellation
4. Write few lines about every planet of the solar system.
5. Explain why do we see phases of moon.

## ANSWER

### MCQ Answer:

1. Answer: (b) Galaxy
2. Answer: (b) 76 years
3. Answer: (b) constellation
4. Answer: (b) Saturn
5. Answer: (b) Light year
6. Answer: (a) constellation
7. Answer: (d) Sun
8. Answer: (a) Comet
9. Answer: (c) Asteroids
10. Answer: (a) Venus
11. Answer: (c) Milky Way
12. Answer: (d) Great bear
13. Answer: (a) constellation
14. Answer: (c) meteors
15. Answer: (b) Neptune

### Very Short :

1. **Answer:** Venus brightest of all planets.
2. **Answer:** Jupiter mainly consists of hydrogen and helium gases
3. **Answer:** When seen from earth stars appears to move from east to west.
4. **Answer:** As it lies on the imaginary axis of the rotation of the earth.
5. **Answer:** asteroids are the rocks pieces that revolve around the sun between the orbit of Mars and Jupiter.
6. **Answer:** Halley's Comet. Heavenly bodies that revolve around the sun and appears as bright as the glowing ball with a long tail is called a comet.
7. **Answer:** meteors when enters the earth's atmosphere starts glowing and are seen as a bright streak of light flashing momentarily across the sky.
8. **Answer:** 36000km and used for satellite communications.
9. **Answer:** Indian National Satellite.

10. **Answer:** Aryabhata on 19 April 1975

### Short Answer :

- Answer:** The stars the planets and many other objects in the sky are called celestial objects. For example: moon, nine planets, asteroids etc.
- Answer:** Moon has no atmosphere and as we know sound cannot travel when there is no medium thus we cannot hear any kind of sound on the moon.
- Answer:**

**(a) Moon:** Moon is a celestial object that does not have its own sunlight; it is visible to us due to reflected sunlight. There is no atmosphere and water on the moon, its surface is dusty and barren. Moon revolves around the earth so it is also called the natural satellite of earth.

**(b) Stars:** Stars are other celestial object that can be seen in the night sky. Sun is the nearest star from the Earth; the stars are millions of times farther than the sun, STARS are present in the sky during the day time also but because of the bright sunlight they are not visible to us. They appear to move from east to west in the sky.
- Answer:**

Planet	Star
(i) Have no light of their own. (ii) Do not twinkle. (iii) Most planets on the other hand are near enough to the earth to be magnified by the telescope. (iv) Planets have low temperatures (v) There are only nine planets in the solar system.	(i) Have their own light. (ii) Twinkles at night. (iii) Since the stars are very far away, the telescope can only make them look brighter but not larger (iv) A star has very high temperature. (v) There are billions of stars in the celestial sphere

- Answer:** A moon is simply a natural satellite that moves around a planet, tied gravitationally to its parent planet. But a star is a large mass of gas that generates energy due to the thermonuclear fusion reactions happening at their cores. They range in size from a few kilometres in diameter to several times larger than the solar system. They form

large collections that make up star clusters and galaxies.

6. **Answer:** On July 21, 1969 the American astronaut, Neil Armstrong landed on the moon for the first time.
7. **Answer:** Some characteristics of stars are as follows:
- I. Have their own light.
  - II. Twinkles at night.
  - III. Since the stars are very far away, the telescope can only make them look brighter but not larger
  - IV. A star has very high temperature.
  - V. There are billions of stars in the celestial sphere
8. **Answer:** We are not able to see the stars during the day time because of the bright sunlight.
9. **Answer:** Earth rotates on its axis from west to east, thus stars appear to move from east to west.
10. **Answer:** Group of stars having a recognisable shape is called constellation. Constellation is an internationally defined area of celestial sphere. For example: Ursa Major, Orion etc.

### Long Answer:

#### 1. Answer:

The sun along with the eight planets, the moons, and other heavenly bodies form the solar system. Our solar system is a part of the milky way galaxy. The sun is at the centre of the solar system around which all other planets rotate. Except Mercury and Venus, remaining six planets have their natural satellite revolving around them in a particular orbit. In our solar system, Earth is the only planet having life. This is due to the hostile conditions available in it. Sun is the ultimate source of energy for sustenance of life on the Earth.

#### 2. Answer:

Some special environmental conditions responsible for the existence and continuation of life on the Earth are:

- Right distance from the Sun
- Right temperature range
- Presence of water
- Presence of oxygen and hostile atmosphere
- Presence of a blanket of ozone

#### 3. Answer:

(a) Star and planet

Star	Planet
I. Star twinkles in the sky	I. Planet do not twinkle in the sky.
II. It has its own light.	II. It has no light.
III. It is fixed at a point.	III. It revolve around the sun.
IV. It is very big in size.	IV. It is very small compared to the star.

(b) Asteroid and comet

Asteroid	Comet
I. Asteroids are made up of metals and rocky material.	I. Comets are made up of ice, dust and rocky material.
II. It rotates nearer to the sun.	II. It rotates farther from the sun.
III. It does not has any tail of volatile material.	III. It has tail of volatile gases when passing close to the sun.

(c) Meteoroid and comet

Meteoroid	Comet
I. It is a small particle from a comet or asteroid orbiting the sun.	I. It is made up of ice, dust and rocky material.
II. It enters the Earth's atmosphere.	II. It does not enter the Earth's atmosphere.

(d) Galaxy and constellation

Galaxy	Constellation
I. It is a collection of billions of star.	I. It is a collection of only a few stars.
II. It does not resemble shape of human beings or animals.	II. It is arranged in patterns resembling human beings or some animals.

III. There are billions of galaxies in the Universe.

III. There are only about 88 constellations.

#### 4. Answer:

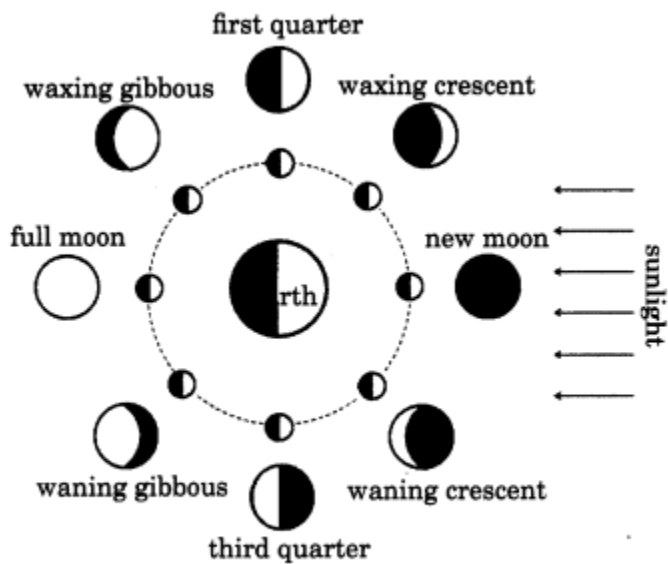
There are total eight planets in our solar system which are as follows:

- Mercury: Mercury is the planet which is nearest to the sun. It is the smallest planet of the solar system. It has no satellite of its own.
- Venus: Venus is the second planet in our solar system. It is the brightest planet in the night sky.
- It has no moon or satellite of its own.
- Earth: It is the third planet of the solar system and is the only planet on which life exists. It has only one moon.
- Mars: The fourth planet of our solar system is Mars. It is also called the red planet. Mars has two satellites.
- Jupiter: It has large number of satellites and it is the largest planet of our solar system.
- Saturn: Saturn appears yellowish in colour. It contains beautiful rings which are not visible with naked eyes.
- Uranus: It is the seventh planet of our solar system. It is the second outermost planet of solar system.
- Neptune: It is the last planet of our solar system.

#### 5. Answer:

The moon does not have its own light. We see the moon because the sunlight falling on it gets reflected toward us. Thus, we see only that part of the moon which reflects light keeps on changing daily. This happens because the moon revolves around the earth along with this moon also revolves around the sun. Therefore, we see phases of the moon.





► Fig. 17.8 Phases of Moon

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