

CH- 17

STAR AND SOLAR SYSTEM

STARS & SOLAR SYSTEMS:-

- The objects which exist in the sky are called celestial objects.
- Star, planets like earth ,satellites like moon, asteroids, comets, meteoroids, stars (etc)are called celestial objects.
- In this chapter we are going to learn about various celestial objects.

NIGHT SKY:-

The various celestial objects which we can see easily in the night sky are stars, planets, moon & meteors(or shooting stars)

An important characteristic of stars is that they appear to twinkle in the sky.

Planets do not twinkle because they are much more nearer to the earth than the stars.

Moon is the most prominent object which we can see in the night sky.

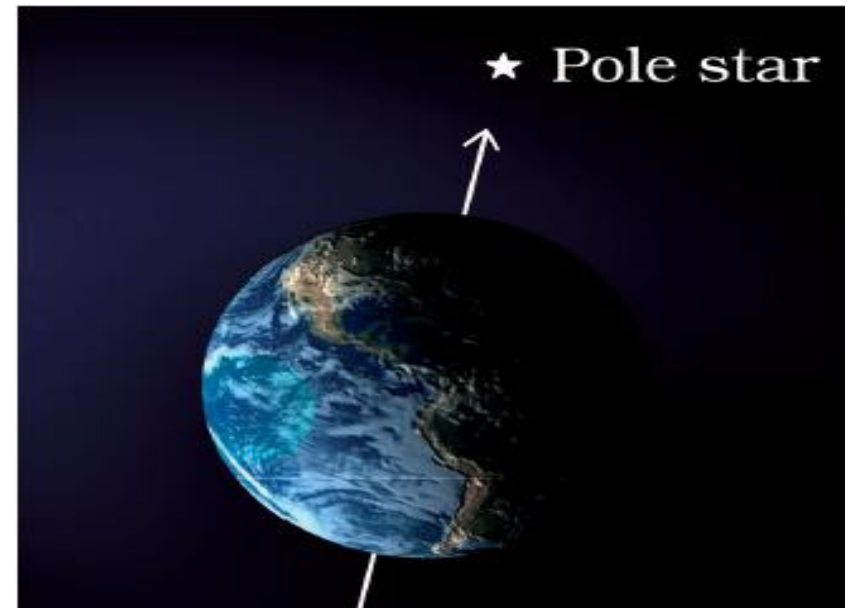
STARS:-

- Stars are the celestial objects that are extremely hot & have light of their own.
- The stars appear to be small because they are very, very far away from us.
- The sun is the star which is nearest to the earth. The sun looks much bigger & brighter because it is much nearer to us than any other star.

STARS:-(cont)

- Though the stars are present in the sky even during the daytime, but we cannot see them during day time because of the bright light of the sun .
- The stars appear to be move in the sky from east to west direction .This apparent motion of the stars in the sky from east – west is due to the rotation of earth from west – east on its axis

POLE STAR:-



- The star which appears stationary from the earth is called pole star.
- The pole star appears to be stationary & does not change its position with time because it lies on the axis of rotation (which is fixed in space & does not change with time)

THE UNIT OF MEASURING DISTANCES IN UNIVERSE: LIGHT YEAR

The distances between the various celestial objects (like stars & planet) are expressed in the unit of “Light Year”. One light year is the distance travelled by light in one year.

$$1 \text{ light year} = 9.46 \times 10^{12} \text{ year}$$

Light year is the unit of distance.

After the sun the nearest star is “proxima centauri”.

The distance between proxima centauri & earth
is 4.3 light years

CONSTELLATIONS:-

The group of stars which appears to form some recognizable shape or pattern is known as constellations.

Each constellation has been given a name signifying an animal ,a human being or some other object which it appears to resemble.

Some of the important constellations which we can see during night sky are:-

a) Ursa major b) Orion c) Cassiopeia d) Leo major

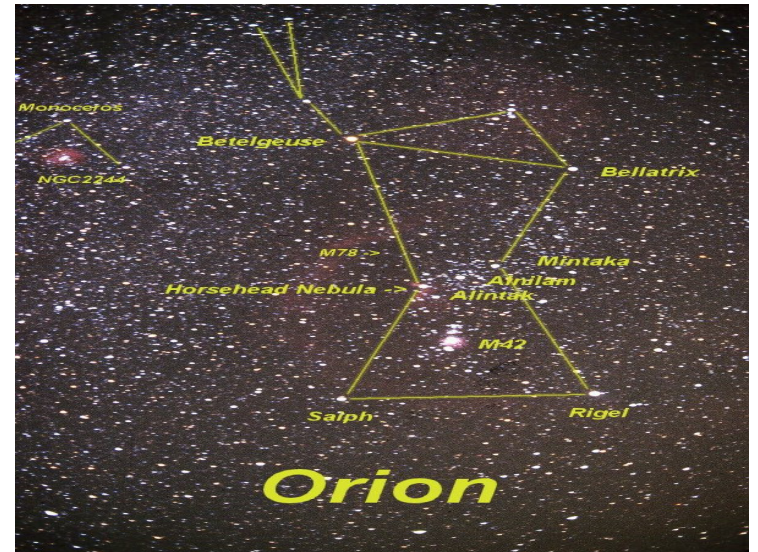
URSA MAJOR CONSTELLATION:-



The Ursa major constellation consists of seven bright stars which are arranged in a pattern resembling some what a big bear. The Ursa major constellation is visible during the summer season.

We can locate the position of Pole star in the night sky with the help of Ursa major constellation. The Ursa major constellation appears to revolve around the pole star in the night sky.

ORION CONSTELLATION:-

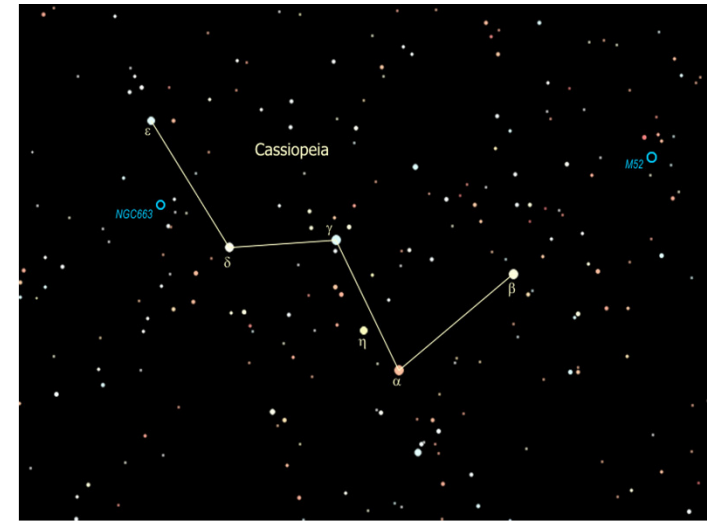


The Orion constellation consists of seven (or) eight bright stars.

The Orion constellation is visible to us in the sky during winter season.

The brightest star in the sky is called “Sirius”.

CASSIOPEIA CONSTELLATION



Cassiopeia constellation consists of 5 main stars.

The Cassiopeia constellation is thought represent queen seated on chair.

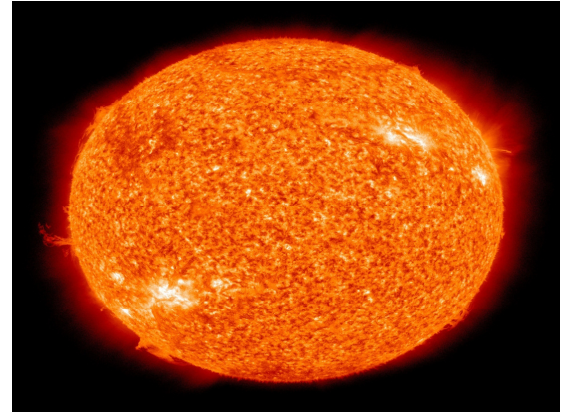
Cassiopeia constellation is visible during winter.

SOLAR SYSTEM:-



Solar system consists of the Sun, the eight planets their satellites & millions of smaller celestial objects such as asteroids, comets & meteoroids. The eight planets of solar system according to their order are:-Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus & Neptune. The gravitational pull of the sun keeps all the planets and other objects revolving around

SUN



The sun is a star. It is a star around which earth & other planets revolve with life on one of its planets called “Earth”. The sun is an extremely hot object having temperature 6000 degree celcius. The sun is not a solid object. The sun consists mostly of hydrogen gas. The sun is the main source of heat & light energy for all the planets of the solar system & their satellites.

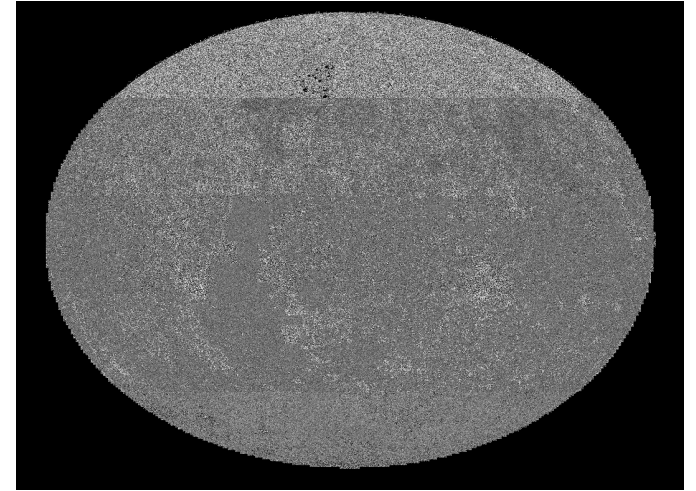
PLANETS:-

Planets are large celestial objects which revolve around the sun in closed elliptical paths are called orbits. The 8 planets of solar system are:-

a) Mercury b) Venus c) Earth d) Mars e) Jupiter
f) Saturn g) Uranus h) Neptune

Planets have no light of own. A planet is made up of rock, metal or gas. All the planets revolve around the sun & also rotate on its axis.

MERCURY:-



Mercury is the planet which is nearest to the sun.
Mercury is the smallest planet of the solar system.
Mercury can be seen either as a morning star in the eastern sky just before the sun rise (or) as an evening star in the western sky just after the sun set.
Mercury shows phases like moon. No life exist on planet Mercury. Mercury has no satellite.

VENUS:-



Venus is the closest planet to the earth. Venus is the brightest object in the night sky. The hottest planet is Venus. The planet Venus can be seen either as a morning star in the eastern sky just before sun-rise (or) as an evening star in the western sky just after sun set. Venus show phases like moon. Venus has no satellite. Venus is called “shukrs graha” in hindi.

EARTH:-



- Earth is the only planet in the solar system on which life is known to exist.
- Earth has one natural satellite called moon
- The earth takes 365 days & 6hrs to complete one revolution & 24 hrs to complete one rotation

HOW LIFE IS POSSIBLE ON EARTH:-

- i. The earth has an atmosphere (which contains many gases including oxygen & carbon dioxide).
- ii. The earth has large quantities of water.
- iii. The earth has a suitable temperature range.
- iv. The earth has a protective blanket of ozone layer.

EARTH'S ROTATION & REVOLUTION:-

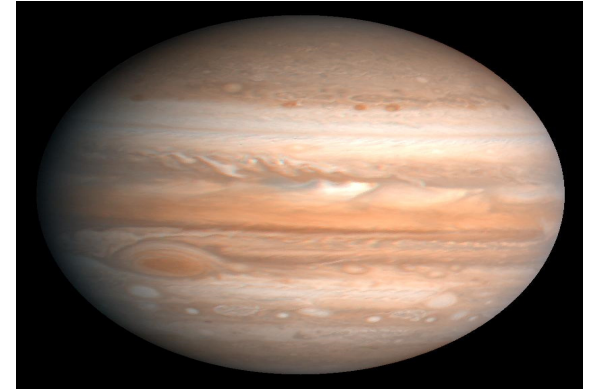
- The earth rotates (or spins) on an imaginary axis which passes through its north & south poles.
- The axis of rotation of earth is slightly tilted with respect to the plane of its orbit around the sun.
- An important consequence of the rotation of the earth on its axis is that it causes day & night on the earth.
- An important consequence of the motion of tilted earth around the sun is that it causes different seasons on the earth (such as summer, winter etc.)

MARS



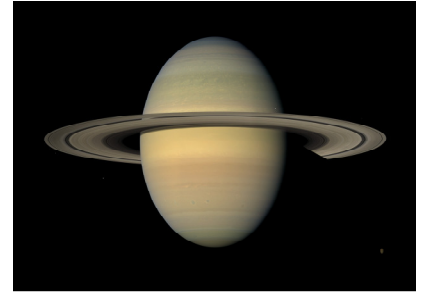
- ✚ Mars is also called the red planet because its surface appears to be red.
- ✚ Of all the planets, mars is most like the earth.
- ✚ The thin atmosphere of mars contains mainly carbon dioxide with small amounts of nitrogen, oxygen, noble gases & water vapour.
- ✚ Mars has two natural satellites

JUPITER



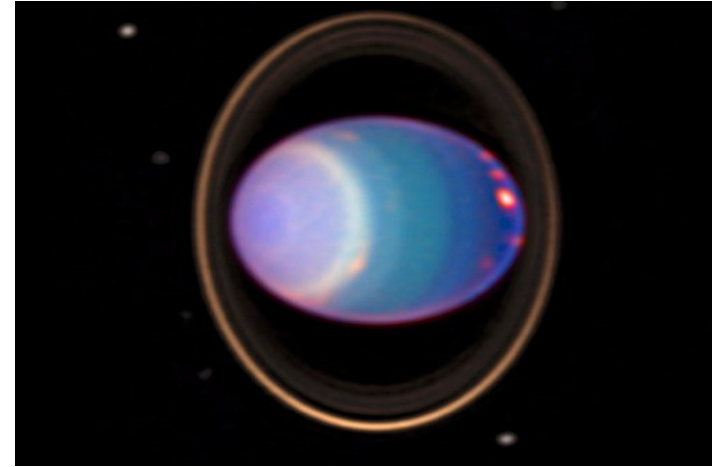
- ❑ Jupiter is the biggest planet of the solar system. It can fit 1300 earths inside it.
- ❑ But when compared to the sun; Jupiter is much much more smaller than the sun.
- ❑ Jupiter appears to be a very bright object in the night sky.
- ❑ Jupiter is made mainly of hydrogen & helium.
- ❑ Jupiter has 28 satellites.

SATURN



- ❖ Saturn is the second biggest planet in solar system. Saturn is also made up mainly of hydrogen & helium.
- ❖ The most distinguishing feature of Saturn is the system of colourful rings around it. The presence of well-developed rings circling Saturn makes the planet unique in the solar system.
- ❖ Saturn has 30 satellites. It is called shani graha in hindi.

URANUS



- ✖ Uranus was the planet to have been discovered with the help of a telescope .
- ✖ Uranus is the third biggest planet of the solar system.
- ✖ The most remarkable feature of Uranus is that it has a highly tilted axis of rotation. Uranus appears to roll on its side while orbiting around the sun.
- ✖ Uranus is made up of hydrogen & helium. The planet has 21 satellites.

NEPTUNE



- The planet Neptune is farthest from the sun & the earth. Neptune is the second planet which was discovered with the help of a telescope.
- Neptune is extremely cold planet. It is the 4th largest planet of the solar system.
- Neptune has 8 satellites. It is called “Varun graha” in hindi.

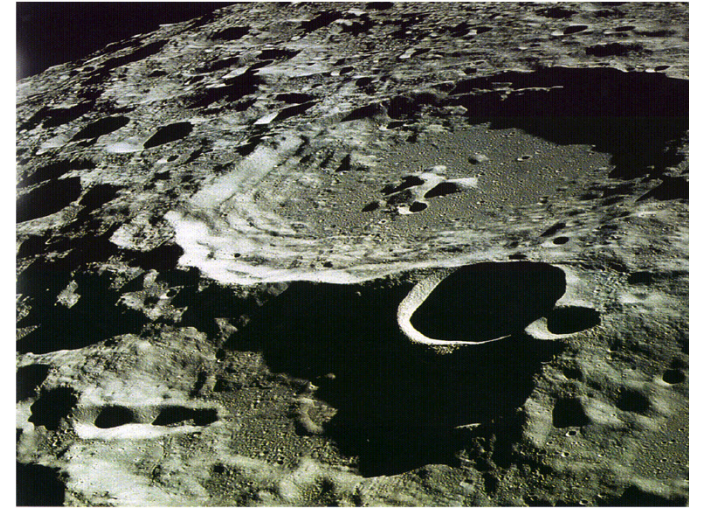
SATELLITE

A satellite is a celestial body that revolves around that revolves around a planet.

Moon is the satellite of the Earth. Mercury & Venus does not have satellites.

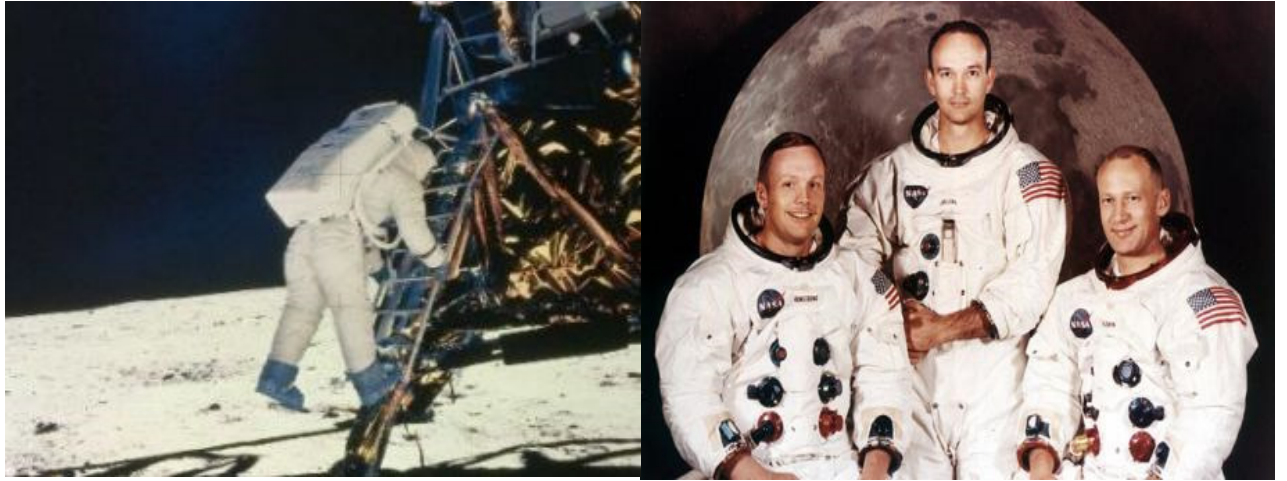
The satellites revolve around the planets due to the gravitational pull of the planets. The satellites have no light of their own, they reflect sunlight.

MOON



- The Moon is the natural satellite of the Earth. Moon is the closest celestial object to the Earth. It takes 29.5 days for moon to rotate the earth.
- The surface of the Moon is covered with hard & loose dirt, craters & mountains.
- Since there is no air & water, life is impossible on moon's surface.

MAN ON MOON

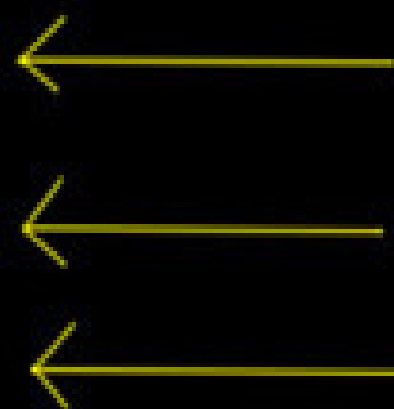


The first man to land on the moon was Neil Armstrong, followed by Edwin Aldrin and the last one Michael Collins of “U.S.A”.

They were a crew of Apollo 11.
They landed on July 1969.

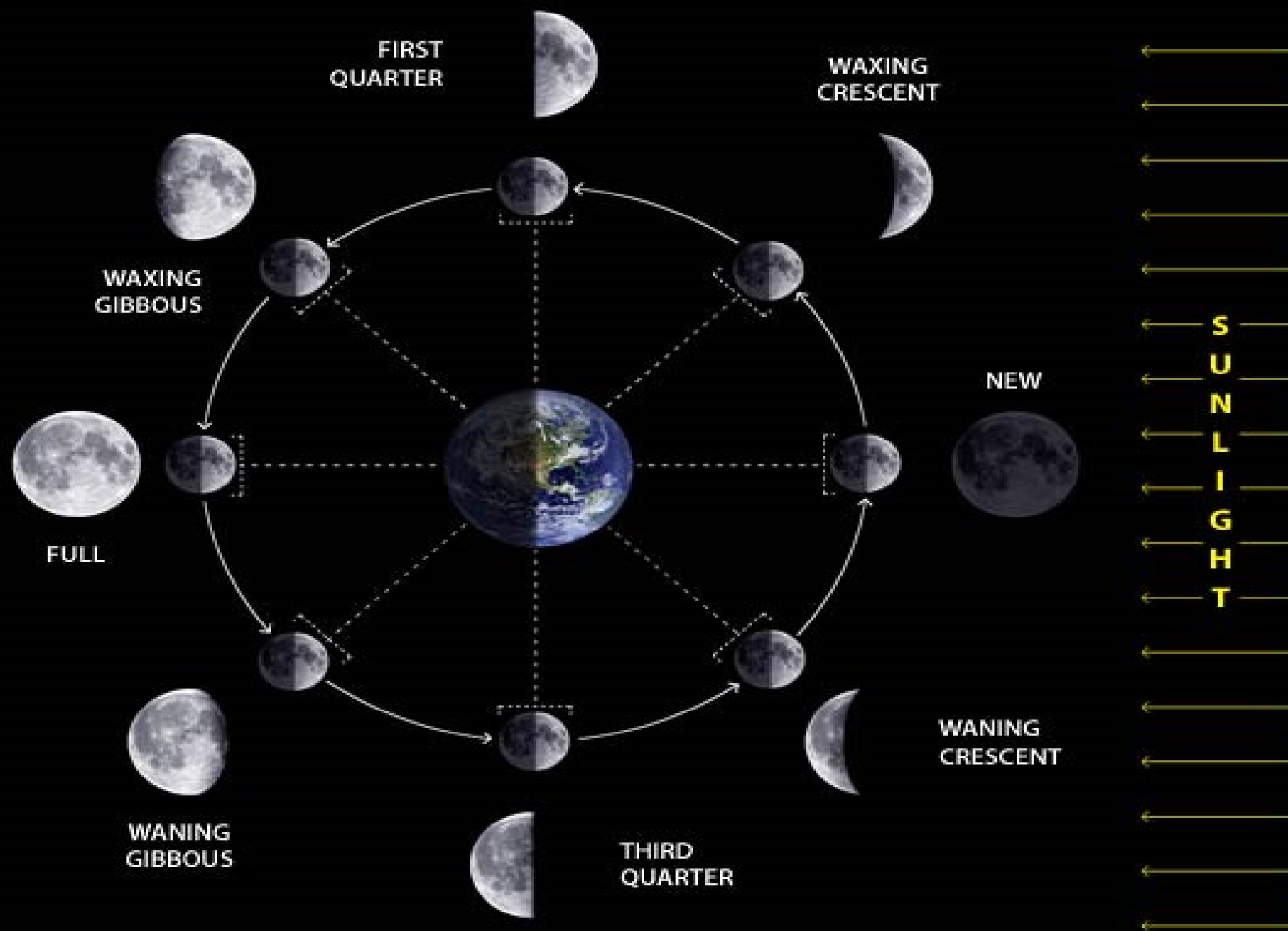
PHASES OF MOON & MOON'S LIGHT

- We are able to see the moon because the sunlight falling on the moon reflected towards the earth.
- The day on which the moon is not visible is called the “new moon day”. The day on which the whole bright disc of moon is visible to us is called the “full moon day”. We have one new moon & one sukk moon day during a month.
- As moon revolves around the earth once every month & moves around the sun along with earth, different amounts of its sun-lit surface are turned towards the earth leading to change in the appearance of moon & formation of phases of the moon.



Sunlight

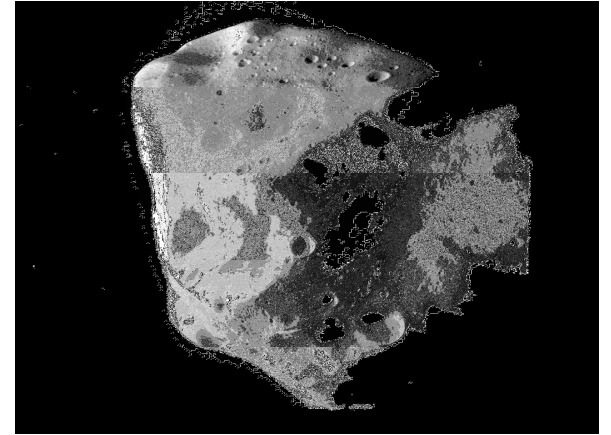




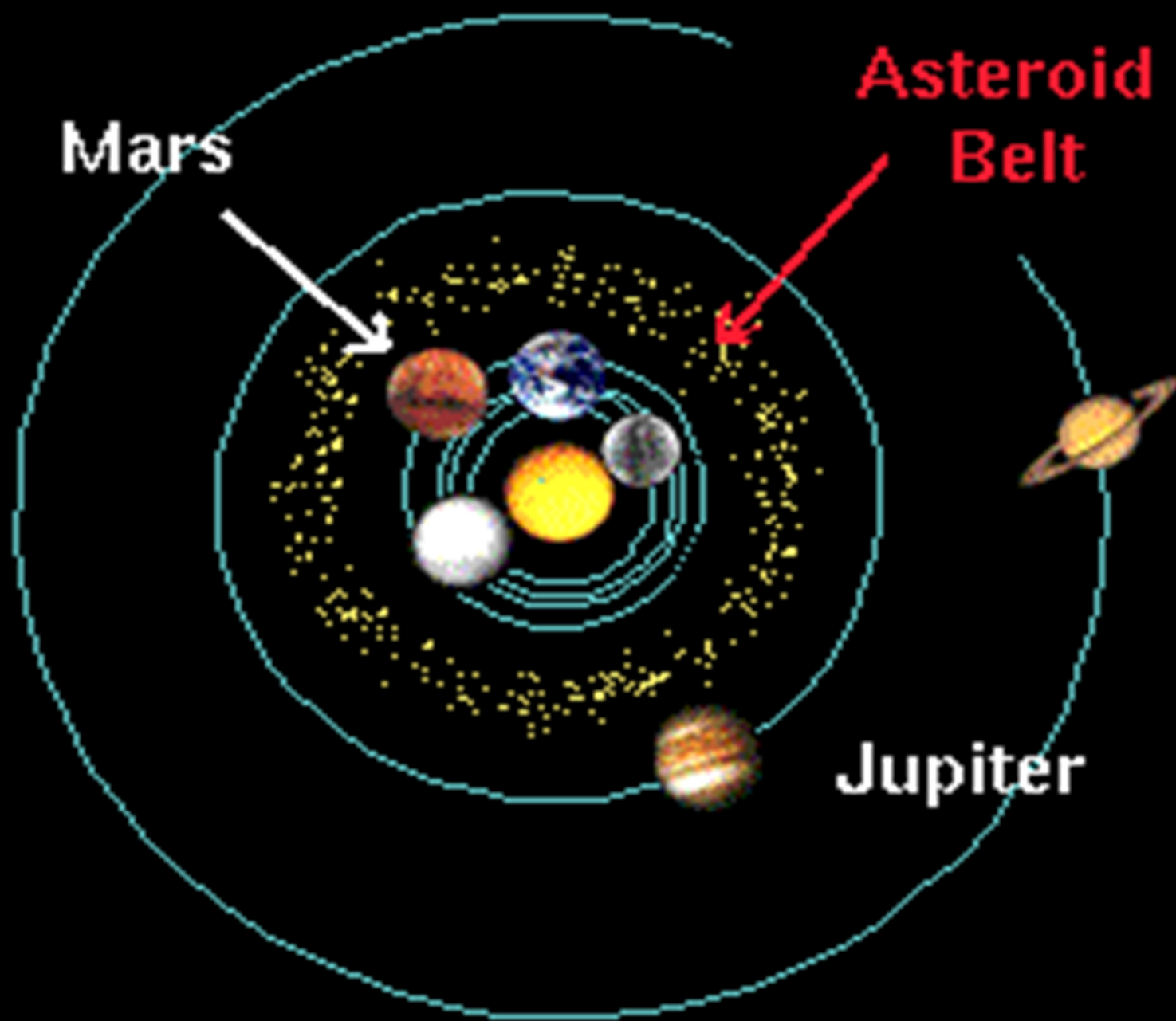
SOME OTHER MEMBERS OF SOLAR SYSTEM:-

In addition to the sun ,planets and satellites ,the solar system also includes asteroids, comets, meteoroids & artificial satellite

ASTEROIDS

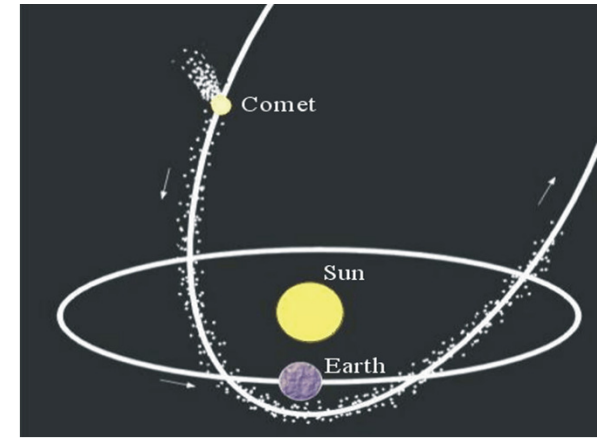


- ✓ Asteroids are the small celestial objects which revolve around the sun between the orbits of Mars & Jupiter.
- ✓ Asteroids are also called minor planets.
- ✓ Asteroids are the members of our solar system
- ✓ Astronomers believe that asteroids are the pieces of matter that were formed at the same time as the rest of the planets which somehow could not assemble to form a major planet.



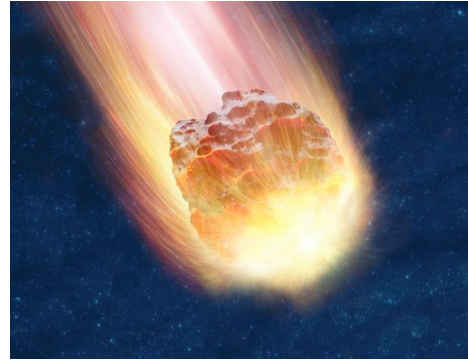


COMETS



- ⊕ Comets are very small celestial objects made of gas & dust which revolve around the sun in highly elliptical orbits & become visible only when they come close to the sun.
- ⊕ Comets are smaller than asteroids.
- ⊕ The period of revolution of a comet around the sun is very, very large. Halley's comet has a period of revolution 76 yrs. It is last seen in 1986.
- ⊕ Each comet revolve around sun in its own orbit.

METEOROIDS : METEORS & METEORITES



- Meteoroids are celestial objects which range in size from tiny sand grains to big boulders of several hundred tonnes & revolve around the sun in their orbits.
- Meteoroids are much smaller than asteroids & comets.
- Meteors are the celestial bodies from the sky which we see as a bright streak of light that flashes for a moment across the sky. The meteors are commonly called “shooting stars”.

METEOROIDS : METEORS & METEORITES (cont)



- A meteor is called a shooting star because, viewed from the earth ,it looks like a streak of starlight shooting across the night sky. A star has its own light but a shooting star has no light of its own.
- A meteor which does not burn up completely on entering the earth's atmosphere & lands on earth, is known as a meteorite.
- Meteoroids are the members of the solar system.

ARTIFICIAL SATELLITES



- A man-made space craft placed in orbit around the earth is called an “artificial satellite”. It is located on the ionosphere of the earth.
- The motion of artificial satellite around the earth is maintained by the gravitational pull of the earth. There are 1072 artificial satellites in the world, in which 50% are Americans.

DIFFERENCES BETWEEN ARTIFICIAL SATELLITE & A MOON

Some of the major differences between artificial satellite & moon is as follows:-

- ❖ The artificial satellites are much nearer to the earth than the moon.
- ❖ The height of the artificial satellites from the earth can be adjusted according to our needs. This is however impossible in moon.

ARTIFICIAL SATELLITES(cont):-

- ❖ The artificial satellites carry a large variety of equipment and instrument inside them.
- ❖ The electricity required for running the equipment in an artificial satellite is provided by solar cells.
- ❖ The technique of collecting information about an object from a distance (without making any physical contact of an object) is called “remote sensing”.

APPLICATIONS OF ARTIFICIAL SATELLITE:-

Some of the major applications of artificial satellites are:-

- Artificial satellites are used for communication such as long distance transmission of television, radio, internet, etc.
- Artificial satellites are used for weather forecasting giving advance warning of floods, cyclones etc.
- Artificial satellites are used for surveying the natural resources of the earth.

APPLICATIONS OF ARTIFICIAL SATELLITES (cont):-



- Artificial satellites are used for spying for military purposes (like observing the movement of enemy troops & military equipment, taking pictures of enemy fields etc.).
- Artificial satellites are used to collect information about other planets ,stars & galaxies, etc.

“ARYABHATTA”



- ✚ India has built & launched many artificial satellites.
- ✚ The first artificial satellite launched by India was “Aryabhata”.
- ✚ Some other Indian satellites are : BHASKARA, INSAT, IRS, ROHINI, KALPANA-1, EDUSAT.
- ✚ The agency responsible for the development of space science programmes in our country is “Indian Space Research Organisation”(ISRO).