

Master Lesson Plan

For

The Earth in the Solar System

Board	Standard	Subject	Chapter	Language	Reference Link	Creation date
CBSE	STD VI	Social Science	The Earth in the Solar System	English	The Earth in the Solar System	2020-06-09 22:56:56

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The Earth in the Solar System

1. SSG_06_01_00_Objectives-The Earth in the Solar System

Objectives

Note to the teachers: This asset contains the objectives of the lesson plan. These are expected outcomes for each asset. It is only for teacher's reference and need not be shown to the students.

The students will be able to...

1. describe the solar system and its members
2. provide information about the discovery of ice on moon
3. differentiate between planets of the solar system
4. illustrate the importance of the Big Bang Theory and its relation to the birth of the planets of the solar system
5. describe the festivals celebrated according to the lunar calendar
6. correlate the effect of distance from the sun to the days of revolution and temperature of each planet
7. describe the characteristics of the planet Earth
8. demonstrate the differences in appearance of each planet of the solar system
9. correlate the movement of the planets to the benefits of leading a disciplined life
10. discuss the characteristics of a planet
11. explain the features of the Sun
12. describe the characteristics of the earth's natural satellite, the moon
13. examine the importance of human-made satellites
14. distinguish between meteoroids and asteroids

Time to teach	Asset Type	Theme	SubTheme
2 Minutes	Main Script	Solar system & the earth	The Solar System, The Solar System

2. The solar system

In the Universe, a **galaxy** is a system containing gas, dust and billions of stars, all bound together by gravity.

There are billions of galaxies of different sizes and shapes, apart from ours.

Our solar system belongs to the Milky Way galaxy, which can sometimes be seen on a clear night sky as a glowing, hazy white band, resembling spilt milk.



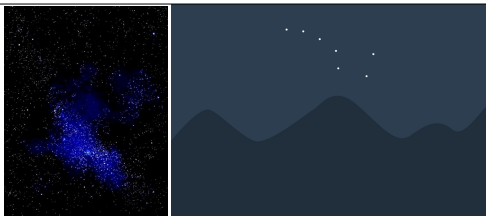
Pics: A galaxy & The Milky Way

The natural bodies that we see in the sky on a clear night are called **celestial bodies**, such as stars, planets, satellites, comets, asteroids and meteors, among others.

* **Stars** are celestial bodies that produce heat and light, e.g the sun that is the centre of our solar system.

- Constellations are groups of stars; some of these form imaginary, recognizable patterns in the sky. e.g. Ursa Major, the Great Bear and Orion, the Hunter.

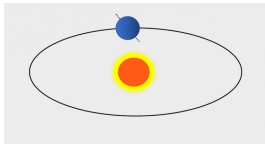
A part of the Ursa Major is the easily recognizable Saptarishis, or Small Bear, a group of seven stars; through this group of stars the Pole Star, always seen above the North Pole, can be located. This star was used as a navigational tool in the years before the compass was discovered.



Pics: Constellation & Ursa Major

* **Planets**, like our earth, are celestial bodies that move in fixed paths, called orbits, around a star.

They do not have any light or heat of their own and derive it from the star.



* **Satellites** are bodies orbiting or revolving around a planet.

The moon which revolves around the earth is a natural satellite.

Artificial or man-made satellites, carried into space by rockets, and used for research and communication purposes, also exist. e.g. INSAT, EDUSAT etc.



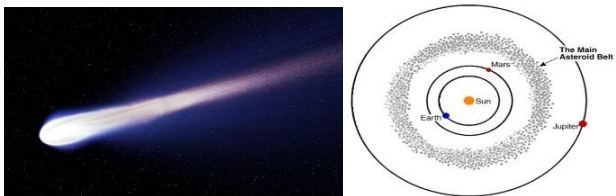
Pics: Earth and moon & Artificial satellite

* **Comets** are small pieces of frozen ice, gas and dust, which orbit the sun, but at immense distances from it.

As a piece nears the sun during its orbit, its frozen core begins to melt, creating a long tail that trails behind it.

* **Asteroids** are irregularly shaped rocky objects that orbit the sun.

They are much smaller than planets, and largely occupy the asteroid belt, a region located between the orbits of Mars and Jupiter.



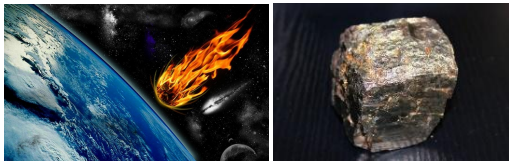
Pics: Comet & Asteroid belt

* **Meteoroids, meteors, and meteorites** Meteoroids are small rocky pieces which may have been left over from the formation of the solar system.

When a **meteoroid** enters the earth's atmosphere, it burns up creating **meteors**.

The burning meteors form streaks in the sky; these are also popularly known as 'shooting stars'.

When meteors do not burn completely during their journey through the earth's atmosphere, they land on earth and are known as **meteorites**.



Pics: Meteor & Meteorite

The Solar Family

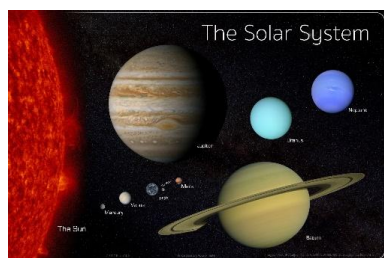
*The word Solar is derived from the Latin word *sol* meaning 'sun'.

*The solar system is the planetary system of the sun and all the objects that orbit it, directly or indirectly.

*These are all bound together by the gravitational pull of the sun.

*Those that directly orbit the sun include the 8 planets, and smaller objects like dwarf planets, comets, asteroids and other smaller bodies.

*Those that orbit the sun indirectly are the moons.



1. Sun

*The sun is a medium-sized star which is the centre of our solar system.

*It is a scorching ball of intensely hot gases and is huge.

*The gravitational pull of this is what keeps together the other celestial bodies within the solar system.

*The entire solar system derives its light and heat from the sun. Its life-giving heat, light and energy support life on earth.

*It is over 100 times wider than earth, and accounts for 99.8 % of the mass of the entire solar system.

*Light from the sun travels approximately 150 million kms to reach earth in 8 minutes.



2. 8 planets

*Our solar system has 8 planets that orbit around the sun.

*They are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

*Until 2006 Pluto was also considered a planet, but is now termed a dwarf planet.

*They move on elongated, elliptical orbits.

*Planets are usually made up of rocks, metals and gases.



Pic: Solar system

*The four planets closest to the sun-- Mercury, Venus, Earth and Mars---are known as the inner planets or the terrestrial planets.

*They have mainly rocky solid surfaces, no rings, and few or no moons.

*Venus is considered earth's twin since they are both similar in terms of shape and size.



Pic: Inner planets

*The inner planets are followed by the asteroid belt, and then the four outer gas giants, the Jovian planets-- Jupiter, Saturn, Uranus and Neptune ---which have surfaces that are gaseous.

*They have rings around them, which are belts of debris.

*Only planet Saturn's rings are visible from Earth.



Pics: Asteroid belt and Outer planets

3. Earth

*Earth, the third planet from the sun, is the fifth largest in the solar system.

*It is the only planet that supports life with its ideal temperatures, availability of water and correct composition of air.

*It is a rocky planet, but covered mostly with water which looks blue from outer space and has resulted in earth being called a blue planet.

*It is not perfectly spherical since it is slightly flattened at the Poles. This shape is called 'geoid' shape.

*Earth takes 365 days to orbit around the sun.



4. Moon

*The moon is the earth's only natural satellite.

*It is held by Earth's gravitational pull.

*It takes the same time to spin on its axis as it does to orbit around the earth. As a result of this, it is the same side of the moon that is always visible from earth.

*The sun is about 400 times bigger, and about that much further, than the moon from earth, so the apparent size of the moon and the sun from earth are the same.

*It has no water or air and the surface is uneven with dead volcanoes, craters and vast plains of solidified lava.



Image sources:

- Galaxy: <https://en.wikipedia.org/wiki/File:Sig07-009.jpg>
- The milky Way: https://en.m.wikipedia.org/wiki/File:Milky_Way_Galaxy.jpg
- Constellation: <https://pxhere.com/en/photo/1374280>
- Ursa Major: <https://pixabay.com/vectors/great-bear-ursa-major-sky-star-1426516/>
- Planet orbiting: SSSVV Gallery: https://www.srisathyaivaividyaavahini.org/alfresco/d/direct/workspace/SpacesStore/c6f25b3d-c548-4a31-9b8b-2538b1285659/revolution-8190?ticket=TICKET_b095ad7ba24b78d65dd1c7d60d7e75477903491e
- Earth and moon: CC - <https://pixabay.com/illustrations/the-stars-the-earth-blue-planet-1450362/>
- Artificial satellite: CC - <https://commons.wikimedia.org/wiki/File:India-Satellite.svg>
- Comet: CC - <https://pixabay.com/illustrations/space-stars-comet-astronomy-1486556/>
- Asteroids CC - https://commons.wikimedia.org/wiki/File:Asteroid_Belt_around_Earth.jpg
- Meteor: CC - <https://pixabay.com/illustrations/meteor-fire-comet-planet-earth-1420503/>
- Meteorite: CC - <https://www.maxpixel.net/Stone-Metallic-Metal-Part-Piece-Meteorite-3630213>
- Shooting stars CC - <https://pixabay.com/vectors/shooting-stars-meteor-colors-stars-155802/>
- Solar system: Solar system: CC BY 2.0 - <https://www.flickr.com/photos/kevinmgill/36469402574> by Kevin Gill
- Sun: CC - <https://pixabay.com/photos/solar-flare-sun-eruption-energy-912129/>
- The Solar System: PIA10231, mod02: CC by 2.0 - <https://www.flickr.com/photos/11304375@N07/2818891443>
- Inner planets: CC - <https://pixabay.com/photos/planet-inner-planets-11060/>
- Asteroid belt: <https://pixabay.com/illustrations/space-asteroids-planets-cosmos-1422642/>
- Outer planets: CC - <https://pixabay.com/illustrations/outer-space-nasa-science-galileo-89136/>
- Earth: CC - <https://www.pexels.com/photo/earth-space-universe-globe-41953/>
- Moon: CC - <https://pixabay.com/illustrations/full-moon-moon-full-night-sky-2055469/>

Time to teach	Asset Type	Theme	SubTheme
15 Minutes	Main Script	Solar system & the earth	The Solar System, The Solar System

3. Earth-our planet



Pic: Earthrise reimagined

1. Why is Earth a unique planet?

Ans: Earth is the only planet which has air, water and all ideal atmospheric and geological conditions that can sustain life.



Pic: Environment protection

2. Why does Earth look like a blue ball when seen from outer space?

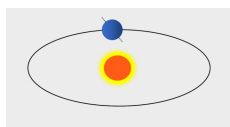
Ans: Three-fourths of the planet is covered by water. Seen from outer space the earth's atmosphere scatters the light and it appears blue.



Pic: Blue sphere

3. Why does earth not float towards the moon or a nearby planet Venus?

Ans: Our Sun's gravity keeps the earth on a fixed path that prevents collisions with other planets or celestial bodies.



Pic: Planet's orbit

4. Why do we not feel the intense heat of our sun even though our nearby twin planet, Venus, has an intensely hot, uninhabitable surface?

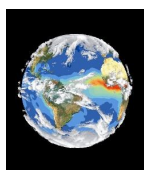
Ans: The heat radiated by the sun passes through our protective atmosphere and is also reflected back through it.

5. Although earth has distinctive seasons, we find a change in the seasonal pattern on earth. What do you think is the possible reason for this?

Ans: Seasonal patterns are showing an unnatural variation.

This is due to global warming caused by human consumption of fossil fuels.

- Extreme weather such as heat waves, flooding and droughts are on the rise.
- Spring arrives earlier and winters are shorter.



Pic: Seasons

Image sources:

- Earthrise reimagined - <https://earthobservatory.nasa.gov/images/87233/earthrise-reimagined>

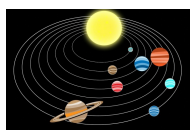
- *Environment protection* – CC - <https://pixabay.com/photos/environmental-protection-environment-683437/>
- *Blue sphere* – CC - <https://pixabay.com/illustrations/globe-world-earth-planet-1339833/>
- *Planet's orbit* – SSSVV Gallery - https://www.srisathyaivaividyaavahini.org/alfresco/d/direct/workspace/SpacesStore/c6f25b3d-c548-4a31-9b8b-2538b1285659/revolution-8190?ticket=TICKET_b095ad7ba24b78d65dd1c7d60d7e75477903491e
- *Seasons*: CC - <https://www.flickr.com/photos/nasacommons/9464665031>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Inquisitive Questions	Solar system & the earth	The Solar System, The Solar System

4. SSG_06_01_10_MS_Planets

Planets

- **Planets** are **celestial bodies** of our solar system just like stars, natural satellites, asteroids and comets.
- A planet moves around a star, such as the sun, in its **orbit** or fixed path.
- This path is elliptical or **elongated**.



Pic: Our solar system

- **Planets orbit the star directly**, unlike natural satellites such as the **moon**, which orbits the planet directly, and the **star indirectly**.
- There are many solar systems in the universe.
- Each solar system comprises of different numbers of stars and planets.
- Our solar system has **8 planets**.
- These orbit around our star, the Sun.



Pics: Orbit of planets, Solar system

- Planets have no light or heat of their own and get it from the parent star.
- In our solar system, planets such as Earth get heat and light from the Sun.
- Starting from the planet closest to the sun, the 8 planets of our solar system are:

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

(A tip to remember the order of planets: **My Very Efficient Mother Just Served Us Nuts**)

- Pluto which was considered a planet until recently, is now listed as a dwarf planet.



Pics: Solar system planets

Inner/Terrestrial Planets

•Mercury

- Closest to the sun
- Very hot on side facing the sun
- 88 days orbit
- Smallest planet
- Terrestrial

•Venus

- "Earth's twin"--similar size and mass
- High atmospheric temperature and pressure
- Terrestrial

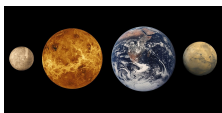
•Earth

- Third planet from the Sun
- Only planet with life
- Liquid water only found here
- Terrestrial

•Mars

- Called "Red planet" due to reddish iron oxide in the soil

- Thin atmosphere
- Terrestrial



Pic: Inner planets--Mercury, Venus, Earth, Mars.

Outer/Gaseous Planets

•Jupiter

- Largest planet in our solar system
- Stormy atmosphere
- Has many moons
- Gas giant

•Saturn

- Sixth from the Sun
- Second-largest planet
- Large and complex ring system
- Gas giant

•Uranus

- Four times larger than earth
- Gas giant

•Neptune

- Farthest from the Sun
- 165 earth years to orbit
- Gas giant



Pic: Outer planets -Jupiter, Saturn, Uranus and Neptune.

Image sources:

Our solar system: <https://pixabay.com/illustrations/solar-system-planets-sun-space-4255609/>

Orbit of planets- SSSVV Gallery- (Keyword –Revolution)

Solar system -<https://pixabay.com/illustrations/solar-system-planets-space-414388/>

Solar system planets - <https://pixabay.com/photos/space-universe-solar-system-4641363/>

Planets (inner planets) - <https://pixabay.com/photos/planet-inner-planets-11060/>

Planets (outer planets) - <https://pixabay.com/illustrations/outer-space-nasa-science-galileo-89136/>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Solar system & the earth	The Solar System, The Solar System

5. The Big Bang Theory

- The universe is believed to have been created 13.8 billion years ago.
- In the beginning there was just a single point of infinite density.
- This single point is called Singularity.



Pic: Singularity : CC - <https://www.maxpixel.net/Universe-Cosmos-Black-Hole-Singularity-Space-3490482>

- From within this single point, thousands of times tinier than the head of a pin, our entire universe was created. This included galaxies, stars, planets and all celestial beings, and even space.
- 13.8 million years ago, for no known reason, this unimaginably hot and dense point suddenly expanded, and the universe was born. Along with it time, space and matter came into existence.

- In less than a second this tiny point grew to become larger than a galaxy. The suddenness with which it expanded to such an enormous size caused it to be named the Big Bang.



Pic: Colorful view of the Universe

- After the first incredible spurt of growth, the universe continued to expand, but at a slower rate.
- As the universe expanded, it also cooled, and became less dense.
- Matter started to form as subatomic particles, then atoms, and over time, these clouds of dust and gas came together to form stars.
- After the creation of the new star, the leftover matter clumped together and gradually accumulated to form planets.
- This expansion that started so many billions of years ago continues to this day.
- Our universe is still expanding.



Pic: Universe

Even though there are other theories for how the universe was born, the Big Bang Theory is the most popular and widely accepted of all, since evidence to support this theory seems to exist.

Image sources:

- Singularity : CC - <https://www.maxpixel.net/Universe-Cosmos-Black-Hole-Singularity-Space-3490482>
- Colorful view of the Universe: CC - <https://en.wikipedia.org/wiki/Universe#/media/File:NASA-HS201427a-HubbleUltraDeepField2014-20140603.jpg>
- Universe: CC - <https://pixabay.com/photos/cassiopeia-supernova-cassiopeia-2515913/>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Interesting Asides	Solar system & the earth	The Solar System, The Solar System

6. Models of Planets

Aim :

To describe each planet of the solar system

Resources Required :

Each group will require:

1. Large black chart (as a background to the solar system)
2. 2 white charts (to cut out the sun and 8 individual planets)
3. Compass and pencil
4. Scissor, glue
5. Colours-paint, brushes, container for water, felt pens or colour pencils

The materials should be deposited with the teacher a day before the activity day.

**Setting for the Activity** [Indoor/Outdoor]

Indoor

**Type of Activity:** [Demonstration / Experiment/ Field Trip/ Project]

Project.

Procedure :

1. In an earlier class the teacher can discuss the project, the materials required and also form groups of about 5 children each, depending on class strength.
2. The day before the activity all materials are deposited with teacher.
3. On the day of activity, the teacher will distribute the materials to the groups.

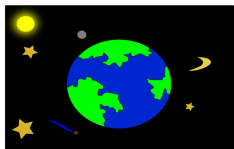
Each group will create a colourful chart clearly showing the physical appearance of each planet and their relative sizes. The planet names should be clearly written.

**Observation :**

The students will be able to differentiate between the physical appearances of each planet.

Conclusion :

This activity will enable the students to remember and recall easily the different physical characteristics of each planet.

**Instructions to Teacher:**

The teacher can observe and give timely help where required.

If it is possible, teacher can consider asking the children to use clay, or any other material, such as papier mache (newspapers soaked in a mixture of water and glue) to make the models of planets.

Precautions :

Care should be taken while cutting out the planets especially the smaller ones, if using chart paper to create the planets.

Troubleshooting :

If the students need help with the relative sizes of planets, this chart can be given to them.

	Planet	Actual diameter rounded off to nearest 100	Scaled diameter for chart
1.	Mercury	4,800 km	0.8 cm
2.	Venus	12,100 kms	1.8 cm
3.	Earth	12,700 kms	2 cm
4.	Mars	6,800 km	1 cm
5.	Jupiter	139,800 kms	22 cm
6.	Saturn	116,500 kms	18 cm
7.	Uranus	51,000 kms	8 cm
8.	Neptune	49,200 kms	6 cm

Image sources:**1.**

Pens – CC- <https://pixabay.com/en/ballpoint-pen-pens-black-writing-41163/>

Pencil – CC- <https://pixabay.com/en/pencil-green-eraser-write-school-308560/>

Eraser- CC- <https://pixabay.com/en/eraser-office-supplies-office-795771/>

Scale- CC- <https://pixabay.com/en/the-ruler-wooden-ruler-setsquare-1970655/>

Glue – CC- <https://pixabay.com/en/school-back-to-school-education-2596090/>

Scissors – CC- <https://pixabay.com/en/a-pair-of-scissors-red-office-paper-3314438/>

Compass – CC - https://www.wpclipart.com/dl.php?img=/tools/miscellaneous/compass/compass_drawing.png

Paints and Paintbrushes – CC - <https://www.maxpixel.net/Color-Brush-Paint-Cans-Of-Paint-Painter-Brush-2724510>

2.

Children in a classroom: CC - <https://pixnio.com/people/children-kids/these-children-at-a-school-in-turkestan-city-are-participating-in-a-national-reading-day>

3.

Students - CC: <https://pixabay.com/photos/students-primary-school-village-1177702/>

Planets : CC - <https://pxhere.com/en/photo/1087836>

Saturn: CC - <https://pxhere.com/en/photo/956587>

Jupiter: CC - <https://pixabay.com/illustrations/universe-planets-space-jupiter-284542/>

Earth: CC - <https://pixabay.com/photos/earth-blue-planet-globe-planet-11015/>

4.

Teacher: CC - <https://www.srisathyaivaividyaavahini.org/index.php/component/joomgallery/default/teacher-5869.html>

Earth in space : CC – <https://pixabay.com/vectors/earth-space-planet-universe-globe-1296078/>

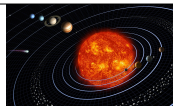
Time to teach	Asset Type	Theme	SubTheme
20 Minutes	Suggested Activity	Solar system & the earth	The Solar System, The Solar System

7. SSG_06_01_11_MS_Sun**The Sun**

Pic: Sun

- The Sun is a star.
- It is at the centre of our solar system.
- It is the largest object in our solar system.
- It makes up 99.8% of the mass of our entire solar system.
- The sun's gravity is so strong it holds the solar system together.

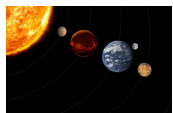
The Sun's gravity



Pic: The solar system

- All the bodies in the solar system are held together by the Sun's powerful gravity.
- These include the planets, asteroids, comets, meteoroids and even the smallest particles that exist in the system.
- Like all stars, the Sun gives out light and heat.
- Planets depend on the Sun for heat and light.

The third planet



Pic: Earth in the solar system

- Our Earth is the third planet from the Sun.
- It is at a distance of 150 million KMs from the Sun.

The Sun's life-giving role



Pic: The Sun

- It is an intensely hot sphere of gases. These gases are held together by its own gravity.
- Although the Sun is the closest star to Earth, its extreme heat is not felt in all its intensity, since it is far from Earth.
- The Sun makes life possible on earth by providing light, heat and energy.

Image sources:

Sun - <https://pixabay.com/illustrations/sun-solar-solar-flare-solar-system-1477210/>

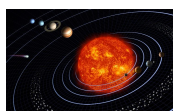
Solar system - <https://pixabay.com/illustrations/solar-system-planet-planetary-system-11111/>

Solar system - <https://pixabay.com/illustrations/solar-system-planet-universe-orbit-3633791/>

Sun - <https://pixabay.com/illustrations/sunset-sky-sea-ocean-setting-sun-298850/>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Solar system & the earth	The Solar System, The Solar System

8. Effect of distance from the sun



Pic: Solar System

- How much heat energy each planet receives from the sun, is determined by its distance from the sun.

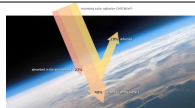
The closer the planet, the more energy it receives, and the warmer it is.



Pic: Sun and planet

- Planet surface temperature can vary from more than 450°C on the closest planets to minus 200°C on the distant Jovian planets.
- The amount of heat that actually reaches the planet surface is determined by the atmosphere, or lack of it, around the planet.

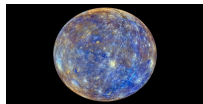
If the planet has an atmosphere-such as earth- it can trap the radiated energy and keep the planet warm, during day and night.



Pic:Earth's energy budget

- If the planet has no atmosphere, like Mercury, the planet surface will receive all the sun's radiated heat, part of which will be absorbed and the rest reflected away.

The side facing the sun in these planets without atmosphere will be intensely hot, and the far side facing away from the sun, will be intensely cold.



Pic: Mercury

	<u>Name of the planet</u>	<u>Distance from sun</u>	<u>Effect of distance from Sun's radiation</u>
1	Mercury	58 million kms	Closest planet to sun, surface temperature can reach upto 450 C. It completes orbit in just 88 days. Sunlight reaches planet in 3.2 minutes.
2	Venus	108 million kms	Hottest planet, hotter than Mercury, temperatures reach 465°C since its atmosphere traps sun's heat. Sunlight takes 6 minutes to reach the planet.
3	Earth	150 million kms	Not too hot or cold surface temperatures. Takes 365 days to orbit. Only planet where most of the temperature is less than the boiling point of water and more than its freezing point—so only planet with liquid surface water. Sunlight reaches in 8.3 minutes.
4	Mars	228 million kms	Cold and dusty desert. Completes an orbit in 687 days. Sunlight reaches in 12.6 minutes
5	Jupiter	778 million kms	Largest planet. Has a gaseous surface. It takes 12 years to complete an orbit. Sunlight takes 43 minutes to reach planet.
6	Saturn	1.4 billion kms	It orbits the sun in 29 earth years. Surface is gaseous. Sunlight reaches in 79 minutes.
7	Uranus	2.9 billion kms	Coldest atmosphere. Ice giant, with a swirling fluid surface. Takes 84 earth years to orbit the sun Sunlight takes 2 hours 40 mins to reach the planet.
8	Neptune	4.5 billion kms	Ice giant. Farthest planet, so gets very little sunlight. Dark and cold with winds of over 2000 kms/hour. 30 times further than earth is from sun. The only planet not visible to naked eye. Orbit takes approx. 165 earth years. Sunlight takes 4 hours to reach the planet.

Image sources

- Solar System-https://en.wikipedia.org/wiki/Solar_System#/media/File:Solar_sys8.jpg
- Sun and planet: <https://pixabay.com/illustrations/sun-planet-planet-unul-stars-1421416/>
- Earth's energy budget: CC - <https://earthobservatory.nasa.gov/features/EnergyBalance/page4.php>

NASA illustration by Robert Simmon. Astronaut photograph ISS013-E-8948.)

- Mercury: CC - <https://www.publicdomainpictures.net/en/view-image.php?image=180527&picture=planet-mercury>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Interesting Asides	Solar system & the earth	The Solar System, The Solar System

9. SSG_06_1_12_MS_Our Satellite Moon

Our Satellite Moon*Pics: Earth, Moon*

- The Moon, is the Earth's only natural satellite.
- It is also the closest celestial body.
- It moves around the Earth, like planets move around the Sun.
- The Moon is approximately 3,84,400 kms away from Earth.

The Sun is about 149.6 million kms away from the Earth

Earth's distance to the Sun is about 400 times the distance to the Moon.

Since it is very near to us, the Moon appears large, as compared to other distant celestial bodies.

- The diameter of the Earth is about 4 times that of the Moon.

*Pics: Full Moon, Atmosphere, Water Droplet, Tree*

- The Moon's surface has large impact craters.

The depressions and mountains create shadows on the moon's surface that are visible from Earth.

- It takes 27 days to go around the earth and the same number of days to complete one spin.

Because of this, the same side of the moon is always visible from earth.

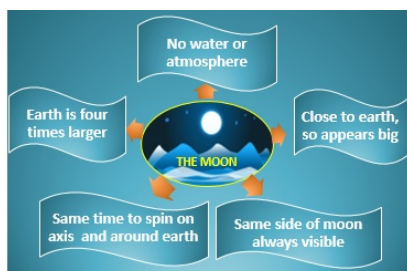
- The Moon has no atmosphere or liquid water, or any other conditions to support life.

*Pic: Astronaut*

- The very first human being to land on the Moon was Neil Armstrong.

He took the historic steps on the lunar surface on behalf of all mankind on 21st July, 1969.

It is hoped an Indian will soon step on the Moon.

*Pic: Arctic moon***Image sources:**

Earth-CC :- <https://pixabay.com/illustrations/world-globe-earth-planet-blue-1303628/>

Moon – CC : - <https://pixabay.com/illustrations/full-moon-moon-full-night-sky-2055469/>

Full Moon – CC : - <https://pixabay.com/illustrations/full-moon-moon-full-night-sky-2055469/>

Atmosphere - CC : - <https://pixabay.com/photos/moon-sky-clouds-celeste-4945895/>

Water Droplets – CC : - <https://pixabay.com/vectors/drop-water-rain-tear-teardrop-147190/>

Tree- CC : - <https://pixabay.com/illustrations/tree-green-nature-environment-3461399/>

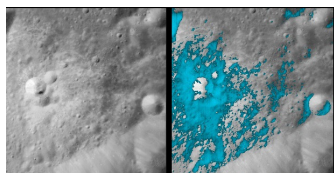
Astronaut –CC : - <https://pixabay.com/photos/planet-ball-shaped-universe-science-3063614/>

Arctic moon--CC: - <https://pixabay.com/vectors/arctic-nightsky-full-moon-ice-152720/>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Solar system & the earth	The Solar System, The Solar System

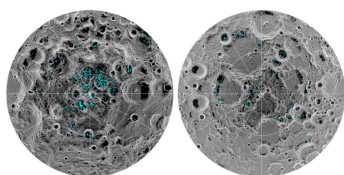
10. Discovery of ice on the moon

- An exciting discovery was made in August, 2018. Ice was discovered on the far side of the moon, that is, the shadowed side that faces away from the earth.
- In a follow-up mission launched in 2019, the orbiter of Chandrayaan-2 is gathering data to determine how much water-ice exists in the polar region.



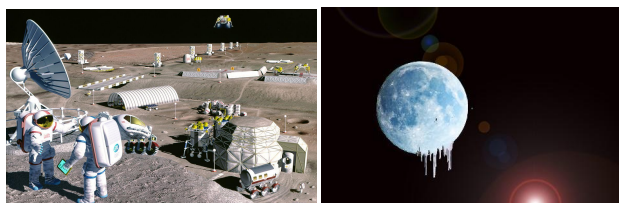
Pic:Lunar ice

- In India's 2018 space mission, surface ice was discovered on the darkest and coldest parts of the North and South poles of the moon by the Indian spacecraft, the Chandrayaan—1.



Pic:Surface ice at the moon's south (left) and north (right) poles

- Scientists have long suspected the existence of water on the surface.
 - It has been a search of decades. They knew water as a liquid could not survive in the lunar atmosphere, and water vapour would not survive the heat of the sun.
 - The existence of underground water was also confirmed. But scientists felt that water in its frozen form could exist in the permanently dark recesses of lunar craters at the poles. Sunlight does not reach these places, and these are intensely cold.
 - This was finally confirmed, and it is now known that ice exists, scattered across the lunar surface, in these shadowed regions.
 - At the **northern pole it is more widely scattered** and at the **southern pole it is found in the lunar craters**.
- Mankind's plans to explore the moon further, and possibly stay on it, is made more possible with this knowledge of the existence of water. This surface ice could become an invaluable source for drinking water, or a host of other uses as required by man for exploration or settlement.



Pics: An artist's concept of a Moon colony & moon

Image sources:

- Lunar water CC - https://en.wikipedia.org/wiki/Lunar_water#/media/File:Chandrayaan1_Spacecraft_Discovery_Moon_Water.jpg
- Surface ice at the moon's south and north poles :CC - https://en.wikipedia.org/wiki/Lunar_water#/media/File:Chandrayaan1_Spacecraft_Discovery_Moon_Water.jpg
- Moon colony – CC: <https://commons.wikimedia.org/wiki/File:Mooncolony.jpg>
- Moon – CC: <https://pixabay.com/photos/moon-night-sky-full-moon-2610983/>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Interesting Asides	Solar system & the earth	The Solar System, The Solar System

11. SSG_06_1_13_MS_Human-made Satellite

Human-made Satellite

WHAT IS A SATELLITE?

- Satellites are of two kinds.



Pic: Natural satellite

- They can be natural, such as our Moon which revolves around the Earth.
- Or they can be artificial, made by human beings.



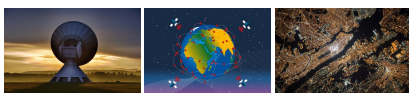
Pics: Artificial satellite, Rocket launch

- These human-made satellites are machines launched into space to orbit the Earth, the Moon, or any other celestial body.
- Human-made satellites are launched into space by a rocket, and then placed into an orbit.

USES OF SATELLITES



Pics: Universe, Mapping, Forecasting weather



Pics: Broadcasting, Communications, Pinpoint location

- Satellites help us:
 - understand the universe, our solar system and its celestial bodies
 - in mapping by collecting data on our earth and its resources
 - in broadcasting by sending TV signals all over the world
 - in communications enabling phone calls from distant parts of the globe
 - forecast weather accurately
 - pinpoint location accurately through the Global Positioning System (GPS).

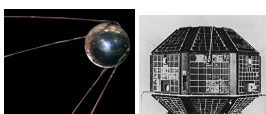


Pics: Satellite Pictures, Astronaut

These artificial satellites do this by sending pictures and scientific information back to earth from space.

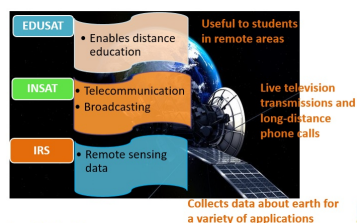
Some man-made satellites carry scientists who conduct various studies on space.

SOME WELL-KNOWN SATELLITES



Pics: Sputnik, Aryabhata

- The first satellite launched by man was the Russian-made Sputnik, in 1957.
- India launched its first satellite, the Aryabhata, in 1975, and has launched over a 100 satellites since then.

IMPORTANT INDIAN SATELLITES

Among Indian satellites,

EDUSAT enables long distance education-especially useful to students in remote areas;

INSAT supports telecommunications and broadcasting, including live television transmissions and long-distance phone calls;

and **IRS** provides remote sensing data about our planet earth for a variety of applications.

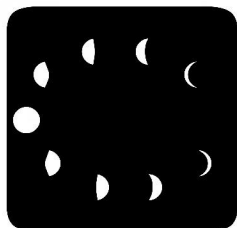
Image sources:

- Natural satellite : <https://pixabay.com/photos/moon-planet-space-astronomy-galaxy-2015826/>
- Artificial satellite : <https://pixabay.com/illustrations/space-station-astronauts-science-485590/>
- Rocket launch: <https://pixabay.com/photos/delta-two-rocket-weather-satellite-614456/>
- Universe: <https://pixabay.com/illustrations/planet-ufo-the-globe-the-world-2087558/>
- Map: <https://pixabay.com/photos/satellite-iss-1030779/>
- Forecast weather: <https://pixabay.com/photos/coast-sea-marine-ocean-beach-1149735/>
- Broadcast: <https://pixabay.com/photos/raising-satellite-reception-signal-1010862/>
- Communicate: <https://pixabay.com/illustrations/world-satellite-love-heart-4842729/>
- Location pinpoint: <https://pixabay.com/photos/new-york-city-new-york-city-1030778/>
- Satellite Pictures: <https://pixabay.com/photos/satellite-iss-northern-lights-1030780/>
- Astronaut - <https://pixabay.com/photos/astronaut-cosmonaut-space-spaceman-1209364/>
- Sputnik - <https://pixabay.com/photos/sputnik-satellite-astronautics-nasa-986/>
- Aryabhata - <https://imagine.gsfc.nasa.gov/science/toolbox/missions/aryabhata.html>
- Indian satellites: <https://pixabay.com/illustrations/satellite-earth-planet-universe-4269342/>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Solar system & the earth	The Solar System, The Solar System

12. Festivals according to the phases of the Moon

- While the secular life in many countries follow the Gregorian calendar, the religious life and its festivals are determined by the lunar calendar in which the lunar months correspond to the phases of the moon, more specifically its waxing and waning cycles.
- It takes a fortnight for the New Moon to wax and become a Full Moon, and another fortnight for it to wane and become a New Moon—together they make one lunar month.



Pic: Phases of the Moon

- Since the Gregorian year has 365 days and the lunar year has 354 days, this difference causes festivals to move back by 11 days each year. Every few years this is corrected by adding a leap month. This is why the festival dates keep changing from year to year.
- Dates of most of the Hindu, Sikh, Buddhist and Jain festivals are decided by the lunar calendar. Many of them coincide with the Full Moon or the day following it. Diwali and Mahashivaratri dates however depend on the New Moon.
- The Christian festival Easter which is also the Jewish Passover, is celebrated on the Sunday on, or after, the New Moon following the spring equinox. The Chinese New Year festival as well as the Tibetan Losar is a celebration of the first day of the lunar year.

Festivals on Full moon



Pic: Holi-Traditionally celebrated with colourful gulal



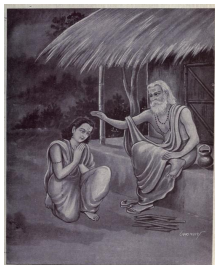
Pic: Rakshabandhan-celebrates the bond between brothers and sisters



Pic: Buddha Purnima-Celebrates the birth of Lord Buddha



Pic: Gurpurab-Sikhs celebrate the birth of their first guru, Guru Nanakji



Pic: Guru Purnima-Festival pays respect to gurus

Festivals on New Moon



Pic-Diwali lights



Pic-Id-ul-fitr moon



Pic-Lord Shiva is worshipped on Mahashivaratri

Major Indian festivals that follow the lunar calendar

Holi	Full moon	Traditionally celebrated with <u>colourful gulal</u> powders
Mahashivaratri	Night before new moon	Celebrated by fasting for a day and night and worship of Lord Shiva
Rama Navami	9 th day of bright fortnight	Celebrates the birth of Lord Rama
Gangaur	3 rd day of dark fortnight	Rajasthani festival celebrating the union of Lord Shiva and <u>Parvati</u>
Buddha Purnima	Full moon	This full moon day celebrates the birth of Lord Buddha
Mahavir Jayanthi	13 th day of bright fortnight	Honours the birth of Lord Mahavira revered by <u>Jains</u>
Id-ul-Fitr	New moon	Celebrations to mark end of <u>Ramzan</u> start after new moon is seen.
Guru Purnima	Full moon	Festival pays respect to gurus
Raksha Bandhan	Full moon day	Festival celebrates the bond between brothers and sisters.
Krishna Janmashtami	8 th day of the dark fortnight	Lord Krishna's birth is celebrated on this day
Ganesh Chaturthi	4 th day of the first fortnight	Celebrates the birth of Lord <u>Ganesha</u>
Vijayadashami/Dussehra	10 th day of bright fortnight	One of the most important Hindu festivals, celebrates victory of good over evil
Karva Chauth	4 th day of dark fortnight	Celebrated by women for the long life of their husbands
Diwali	New moon night	Spectacular festival of lights celebrating....
Gurpurab/Guru Nanak Jayanthi	Full moon day	Sikhs celebrate the birth of their first guru <u>Guru Nanakji</u>

*Bright fortnight/Shukla paksha-waxing moon, dark fortnight/Krishna paksha-waning moon.

*Full moon –purnima, new moon-amavasya.

IMAGE SOURCES:

- Phases of the Moon: <https://www.publicdomainpictures.net/en/view-image.php?image=119866&picture=phases-of-the-moon>
- Rakshabandhan CC : <https://pixabay.com/photos/rakhi-rakshabandhan-india-tradition-2630652/>
- Holi CC: <https://pixabay.com/photos/holi-girl-indian-india-dance-fun-2416686/>
- Golden temple CC: <https://www.maxpixel.net/Sikh-Golden-Temple-India-Amritsar-Punjab-Travel-1833064>
- Buddha CC: <https://pixabay.com/photos/buddha-meditation-relaxation-709875/>
- Shukracharya and Kacha: CC - https://gu.wikipedia.org/wiki/%E0%AA%97%E0%AB%81%E0%AA%B0%E0%AB%81_%E0%AA%AA%E0%AB%82%E0%AA%B0%E0%AB%8D%E0%AA%A3%E0%AA%BF%E0%AA%AE%E0%AA%BE#/media/File:Shukracharya_and_Kacha.jpg
- Diwali: CC <https://pixabay.com/photos/diwali-diya-occasion-candles-arm-1826130/>
- Id-ul-Fitr: CC - <https://pixabay.com/illustrations/ramadan-fanoos-masjid-night-3384596/>
- Shivling: CC - <https://pixabay.com/illustrations/shiv-shiv-ling-hindu-hinduism-1084233/>

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Day-to-day Relevance	Solar system & the earth	The Solar System, The Solar System

13. SSG_06_01_14_AS_Meteoroids and Asteroids

Meteoroids and Asteroids

1. [Choose from the given answers](#)

A. Asteroids move around a.....

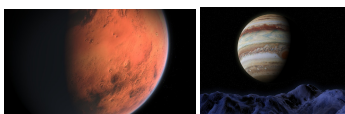
1. Star
2. Planet
3. Moon
4. Galaxy

(Ans: Star)

B. Most asteroids are found in a belt between..... and

1. Earth and Moon
2. Jupiter and Neptune
3. Mars and Jupiter
4. Mercury and Venus

(Ans: 2. Mars and Jupiter)



Pics: Mars & Jupiter

C. Asteroids are

1. Stars
2. Celestial bodies
3. Planets
4. Satellites

(Ans: 2. Celestial bodies)



Pics: Celestial bodies

D. Meteoroids are pieces of

1. Gas
2. Ice
3. Soil
4. Rock

(Ans: 4. Rock)

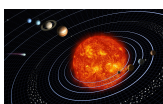


Pic: Rock

E. Asteroids areplanets.

1. As large as
2. Smaller than
3. Slightly larger than
4. Much larger than

(Ans: 2. Smaller than...)



Pic: Solar system

2. Fill in the blanks

1. Meteoroids burn after entering earth's atmosphere and are called..... (Ans: *meteors*)

2.are pieces left over when planets exploded.

(Ans: *Asteroids*)

3.burn on entering Earth's atmosphere.

(Ans: *meteoroids*)

3. Short answer questions**1. When were asteroids formed?**

(Ans: *Asteroids were formed many billions of years back.*

Asteroids are leftover parts of a planet which exploded many years back.)



Pic: Asteroids

2. What causes the flash of light of a meteoroid, in the sky?

(Ans:

- *When a meteoroid enters the earth's atmosphere it is moving at a very high speed.*
- *The friction causes heat, leading to burning of the meteoroid.*
- *From earth, this burning part is seen as a streak of light.)*



Pic: Meteoroid

3. Name two differences between asteroids and meteoroids.

(Ans: *Any two of the following:*

- *Asteroids are much larger than meteoroids.*
- *Asteroids are mostly found in the asteroid belt, meteoroids can be found throughout space*
- *Asteroids cause great impact when they hit earth; meteoroids typically burn in earth's atmosphere.)*



Pic: Asteroid belt

Image sources:

- Mars planet: <https://pixabay.com/illustrations/mars-planet-cosmos-stars-sky-land-2051747/>
- Jupiter planet: <https://pixabay.com/photos/jupiter-ganymede-space-astronomy-2208206/>
- Celestial bodies: <https://pixabay.com/illustrations/star-celestial-body-space-stars-3821972/>
- Meteoroids: <https://pixabay.com/illustrations/asteroids-meteors-rocks-space-2117790/>
- Solar system: <https://pixabay.com/illustrations/solar-system-planet-planetary-system-11111/>
- Asteroids: : <https://pixabay.com/illustrations/asteroid-space-stars-meteor-1477065/>
- Meteoroid: <https://pixabay.com/photos/asteroid-comet-meteorite-3628185/>
- Asteroid belt- CC- <https://pixabay.com/photos/space-universe-solar-system-4641363/>

Time to teach	Asset Type	Theme	SubTheme
10 Minutes	Assessments	Solar system & the earth	The Solar System, The Solar System

14. SSG_06_01_09_VC_Care for the Earth

Care for the Earth*Pic: Only planet with life*

In the Solar system, Earth is the only planet where life is possible.

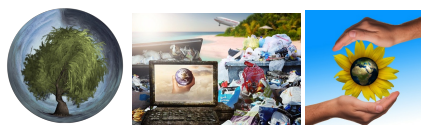
It is beautiful, and full of different kinds of people.

Our planet gives us the food we eat, the materials to make our houses, and the power to create books, light bulbs, and laptops.

We depend on the planet for everything, for both beauty and basic needs; everything we need to live a happy, healthy life and without its resources, we wouldn't exist.

But sometimes we don't know how to say thank you for everything Earth gives us.

We are grateful for what we have!

*Pics-Going green, pollution, caring for Earth*

Going green is easier than you think.

There are little things you can do every day to help reduce pollution and wastage and make a less harmful impact on the environment.

Taking care of the Earth is not just a responsibility – it is a privilege.

**Children! What are the ways that we can care for Mother Earth?**

(Note to Teacher: let children come out with ideas. The teacher can list them on the board.)

Suggested answers:

- Keep your home, neighbourhood and your school clean.

If you see trash on the ground, toss it in a trash can.

- Recycle cans, bottles, and paper.

Save them at home and at school, and help your family recycle them.

- Help keep the air clean.

Ride your cycle or walk to school. ...

- Save paper. Use wisely.

- Help save water.

- Reduce, Reuse & Recycle—reduce waste, reuse and recycle leftover wherever possible

- Plant a tree wherever possible.

Let us learn a song today**CARE FOR THE EARTH**

Now is the time to care for our Earth,

Whoever we may be.

To join our hands, our souls and our hearts,

And to work for unity.

Chorus:

For the world to be a beautiful place,

Full of flowers, birds and trees.

The future lies with nobody else,

It depends on you and me.

The time has come to plant more trees,

Make the air pollution free.

Respect all life, the animals too,

And to live in harmony.

Chorus:

For the world to be a beautiful place,

Full of flowers, birds and trees.

The future lies with nobody else,

It depends on you and me.

Audio source:

Song: <http://sssbpt.org/audio/EHV/Track17.mp3>

Image sources:

- Only planet with life: CCO - <https://pixabay.com/sv/illustrations/m%C3%B6te-grupp-m%C3%A4nniskor-ange-allians-1953060/>
- Going green globe: CCO - <https://pixabay.com/sv/illustrations/arbor-day-tr%C3%A4det-orb-gr%C3%A5t-willow-4047858/>
- Pollution: CCO - <https://pixabay.com/sv/photos/sopor-paradise-sun-flygplan-4277613/>
- Caring for Earth: CCO - <https://pixabay.com/sv/illustrations/h%C3%A4nder-skydda-skydd-solros-globen-1786274/>
- 3 R's - CCO - <https://pixabay.com/sv/vectors/%C3%A5tervinna-gr%C3%B6n-jorden-milj%C3%B6-29227/>

Time to teach	Value Type	Value Sub Type	Value Attribute
7 Minutes	Peace		Songs

15. Planets of the Solar System

1. Match the following

1. Very hot planet, visible to naked eye	A. Earth
2. Jupiter, Saturn, Uranus, Neptune	B. Has many moons
3. Named after Roman God of water	C. Mercury
4. Red, rocky planet	D. Venus
5. Jupiter	E. No longer a planet
6. Closest planet to sun	F. Mars
7. Pluto	G. Neptune
8. Blue planet	H. Gaseous

(Ans:-1-D, 2-H, 3-G, 4-F, 5-B, 6-C, 7-E, 8-A)

2. Fill in the blanks



Pic:Planets orbit

1. A planet always orbits the..... (Ans: Sun)
2. The fixed path of a planet is _____ in shape. (Ans: elongated/elliptical)
3. The earth takes _____ days to orbit the sun. (Ans: 365)
4. The planet Uranus derives its heat and light from _____. (Ans: Sun)
5. Between Mars and Jupiter is a belt comprising of _____. (Ans: asteroids)
6. The planet known for its ring system is _____. (Ans: Saturn)
7. Our solar system belongs to the _____ galaxy. (Ans: Milky Way)
8. The largest object in our solar system is _____. (Ans: Sun)
9. The most powerful storm on the solar system, the Great Red Spot is on planet _____. (Ans: Jupiter).

10. With similar size, mass, density, gravity and composition, _____ is called Earth's twin planet. (Ans: Venus)

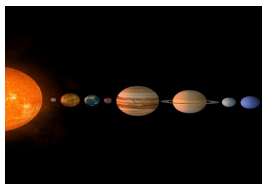


Pics: Saturn, Sun, Venus

3. Short answer questions

1. List all planets in correct order starting from the one closest to sun.

(Ans: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.)

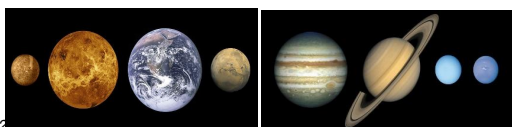


Pic: Solar system

2. Which are the terrestrial and Jovian planets, and how do they differ from each other?

(Ans: Terrestrial-Mercury, Venus, Earth, Mars; Jovian--Jupiter, Saturn, Uranus, Neptune.)

- The surfaces of terrestrial planets are rocky and solid, while Jovian planets have gaseous surfaces.
- Terrestrial planets are smaller and have much fewer natural satellites than Jovian planets.)



Pics: Terrestrial planets (left) & Jovian planets (right)

3. Analytical question

• Explain the differences between a star and a planet in our solar system.

(Ans: Number: Our solar system has only one star-the sun, while there are eight planets.)

- Orbits: the star does not move, but a planet orbits on a fixed path around the star.
- Size: The star is very large, compared to a planet.
- Heat and light: The star gives out its own light and heat, but the planet does not emit its own and is dependent on the star for this.
- Temperature: The star is intensely hot, while the planets are less hot
- Gravity: The sun's gravitational pull is so strong that it keeps all the 8 planets in orbit around it; the gravitational pull of the planets is only sufficient to keep smaller objects, such as satellites, orbiting around it.)

	Star 	Planet 
Number	Sun is the only star	There are 8 planets
Orbits	Star does not move	Orbits on a fixed path around the star.
Size	Very large.	Much smaller than the star
Heat & Light	Emits its own light and heat.	Depends on the star for this
Temperature	Intensely hot	Less hot
Gravity	Strong to keep 8 planets around it.	Less strong. Keeps smaller objects like satellites around it.

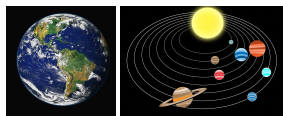
Image sources:

- Planets orbit – Planets orbit – SSSVV Gallery - https://www.srisathyaivaividyaahini.org/alfresco/d/direct/workspace/SpacesStore/c6f25b3d-c548-4a31-9b8b-2538b1285659/revolution-8190?ticket=TICKET_b095ad7ba24b78d65dd1c7d60d7e75477903491e
- Saturn – CC: <https://openclipart.org/detail/261229/planet-saturn-planeta-saturno>
- Sun – CC: <https://openclipart.org/detail/176488/sun>
- Venus: CC - <https://pixabay.com/illustrations/venus-planet-solar-system-space-1017951/>
- Solar system: CC - <https://pixabay.com/illustrations/sun-planet-solar-system-cosmos-1506019/>
- Terrestrial planets: CC - https://ia.wikipedia.org/wiki/File:Terrestrial_planet_size_comparisons_edit.jpg
- Jovian planets: CC - https://commons.wikimedia.org/wiki/File:Gas_planet_size_comparisons.jpg

Time to teach	Asset Type	Theme	SubTheme
10 Minutes	Assessments	Solar system & the earth	The Solar System, The Solar System

16. SSG_06_01_15_Summary- The Earth in the Solar System

Summary - The Earth in the Solar system



Pics: Earth, Solar System

In this lesson we have examined -

- how the universe was born from the point of Singularity
- the many different celestial bodies such as stars, constellations, galaxies, asteroids, meteors, and planets and how they differ
- the relationship between the Sun and the planets and how distance affects the planets
- the individual characteristics of the Sun, planets, Earth and the Moon
- how the Moon and its phases affect our daily life
- details about human-made satellites
- features of meteoroids and asteroids

Image sources:

Earth: <https://pixabay.com/photos/earth-blue-planet-globe-planet-11015/>

Solar System: <https://pixabay.com/illustrations/solar-system-planets-sun-space-4255609/>

Time to teach	Asset Type	Theme	SubTheme
2 Minutes	Main Script	Solar system & the earth	The Solar System, The Solar System