

UNIT 8

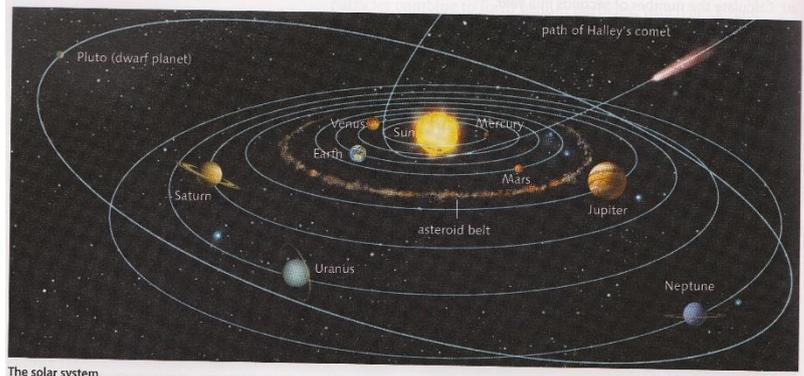


THE SOLAR SYSTEM AND THE UNIVERSE

▶▶ THE SOLAR SYSTEM

The universe contains all the known galaxies, stars and planets. Galaxies are systems of stars. Our **solar system** is located in the **Milky Way** galaxy. It consists of a star, called the sun, eight planets orbiting around it and other celestial bodies such as dwarf planets, satellites, asteroids and comets. The planets in the solar system are divided into two groups:

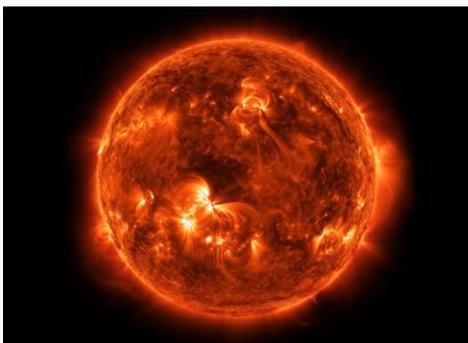
- The **inner planets**: Mercury, Venus, Earth and Mars. These are the four smallest planets and are also called **terrestrial planets** because they have a solid surface, similar to Earth's. They are the planets closest to the sun and don't have many satellites. They are made up mostly of rock and metal. Earth is about 150 million kilometres from the sun.



- The **outer planets**: Jupiter, Saturn, Uranus and Neptune. These are the furthest planets from the sun and they have got many satellites. They are often called the **gas giants**, because they are gigantic gas balls.

▶▶ THE SUN

The Sun is a medium-sized star with a diameter about 1.400.000 km. It is composed of gases, approximately 75 % hydrogen and 25 % helium.



A process called **nuclear fusion** occurs inside it: hydrogen atoms combine to form helium atoms, which are larger. This process releases enormous amount of energy. That's why the temperature in the solar nucleus is around 15.000.000 °C, whereas its surface can only reach 5.500 °C.

The Sun rotates on its axis in an anticlockwise direction. One complete rotation takes between twenty-five and thirty days.

▶▶ THE PLANETS

The orbit of all planets around the sun is approximately on the same plane. The anticlockwise movement of all planets around the sun is called **revolution** and the time that a planet takes to orbit the Sun is called a year. At the same time, planets rotate on its own axis in the same direction as revolution, except in the case of Venus and Uranus. The time that a planet takes in a **rotation** is called a day.

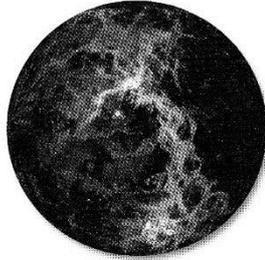
Mercury

Mercury is the closest planet to the Sun. There are lots of **craters** on its surface, the same as on the Moon. It has a very long day (slow rotation): 59 Earth days. Mercury doesn't have an atmosphere so the day and night surface temperatures on Mercury vary widely. Mercury has **no satellites**.



Venus

Venus has a similar size and density to Earth, but its **atmosphere is much denser**. The atmosphere is composed of carbon dioxide and thick clouds formed of drops of sulphuric acid. One day on Venus lasts more than one Earth year. Venus has **no satellites**.



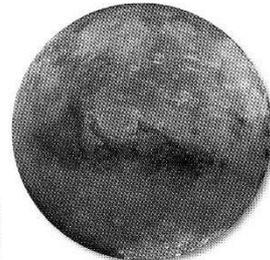
Earth

Earth has optimal conditions for life to develop: the average surface temperature is 15 °C and there are large masses of **liquid water**. The atmosphere is mainly composed of oxygen and nitrogen. It has one large **satellite**: the **Moon**.



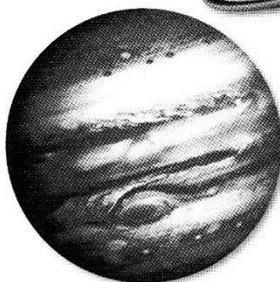
Mars

The surface of Mars resembles the Earth's rocky deserts. A day on Mars is slightly longer than an Earth day and Mars also has seasons. Its thin atmospheric layer contains 95% carbon dioxide, so it is not breathable. Mars has **two small rocky satellites**: **Phobos** and **Deimos**.



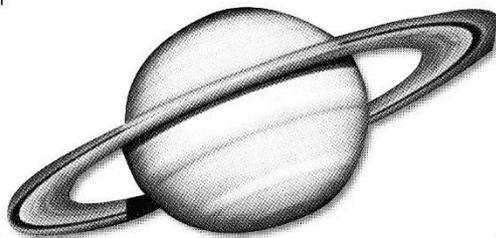
Jupiter

Jupiter is a **gas giant**, composed of 90% hydrogen and 10% helium. It has a rocky core. There are **bands of different coloured clouds** around the planet, parallel to the equator. It contains around 71% of all planetary mass. It has **four large satellites** and about sixty smaller ones.



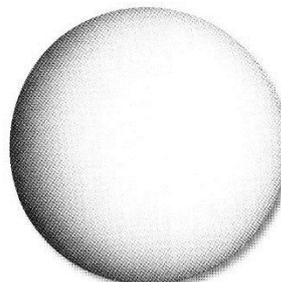
Saturn: the Lord of the Rings

Saturn is also a **gas giant**, composed of 97% hydrogen and 3% helium. Saturn has a spectacular **ring system** made of ice, small rocks and dust particles. It has **seven large satellites** and around thirty small ones.



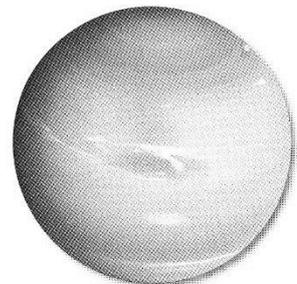
Uranus

Uranus is a **gas giant** composed of hydrogen, helium and methane. Uranus, like Neptune, is very far from the Sun, so it is a **frozen planet**, with very low surface temperatures. It has dozens of satellites; five of them are very large.



Neptune

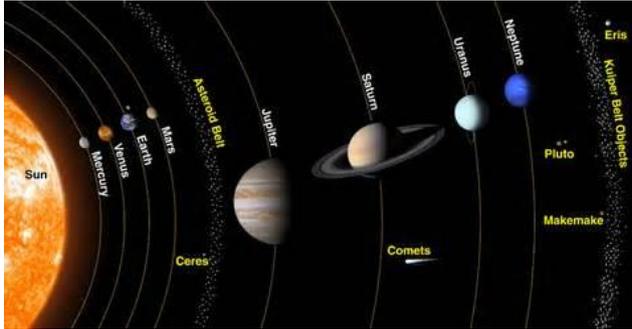
Neptune is a **gas giant** composed of hydrogen, helium and methane. It has a similar size and mass to Uranus. It is also a **frozen planet**, but the temperature inside Neptune is hot, because it releases heat. It has more than a dozen satellites: **Triton** is very large.



The inner planets, closest to the Sun, have solid rocky surfaces. The outer planets, further away from the Sun, have mainly liquid surfaces and they are surrounded by rings.

DWARF PLANETS

They orbit the sun and have a big enough mass to adopt an almost spherical shape, but not to have cleared their orbits' surroundings.



Ceres is the smallest dwarf planet. It was discovered in 1835 in the Asteroid belt.

Pluto is smaller than the Moon. Pluto has three known satellites: Charon, which is very large, and two smaller ones. It belongs to the Kuiper Belt.

Eris was discovered in 2005 and is bigger than Pluto. It has one satellite and is the farthest away dwarf planet in the Kuiper Belt.

Makemake and **Haumea**, considered as dwarf planets since 2008. There are more smaller and distant bodies that could be dwarf planets in the future.

▶▶ SATELLITES

Satellites are celestial bodies that move around the planets. The **Moon** is the Earth's satellite and it takes 28 days to orbit our planet. It has a diameter of 3,476 km, which is about a quarter of the Earth's diameter.

It has no atmosphere, so the average surface temperature is about -18°C . The Moon has not water on its rocky surface and it is covered with craters, caused by the impact of asteroids.

All the planets in the solar system have satellites except for Mercury and Venus. More than sixty moons have already been identified orbiting around Jupiter.



▶▶ SMALL BODIES

- **Asteroids:** these are small rocky bodies, usually of irregular shape, that orbit the Sun in the asteroid belt. Sometimes they collide and change their orbit, crashing into other celestial bodies. Asteroids that impact on Earth's surface are called **meteorites**.
- **Shooting stars:** they are little fragments of other celestial bodies that burn up when entering the Earth's atmosphere, leaving a visible path.
- **Comets:** they are small celestial bodies that orbit beyond Neptune they are made up of ice and dust particles.



Shooting stars can be seen for less than one second.



Halley's comet is visible from Earth every 75 years