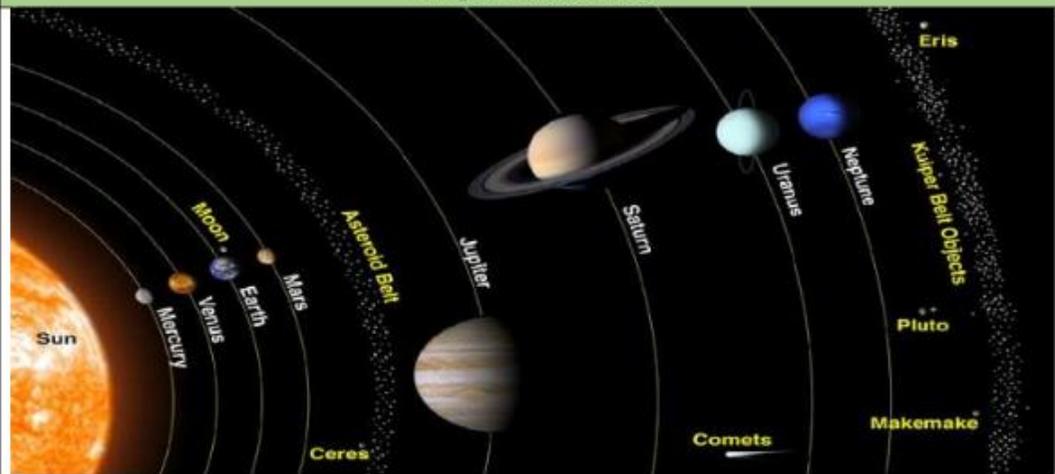
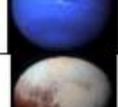


Diagram (not to scale!)



The Sun, Planets, and Dwarf Planets - classification, mean distance from The Sun, moons, and key facts.

<b>The Sun</b> The star at the centre of the Solar System		The Sun is the star at the centre of the Solar System. It is nearly perfectly spherical, and is by far the largest object in the Solar System. In total, it accounts for 99.86% of the mass in the Solar System. It gives life to Earth.	<b>The other objects in the Solar System orbit The Sun</b>	<b>Area:</b> 12,000 x Earth <b>Temperature:</b> 5,778k
<b>Mercury</b> Planet 0.39 AU (1 AU = Earth's distance from the Sun)		Mercury is the smallest and innermost of the planets in the Solar System. It orbits around the Sun in only 88 Earth days, the shortest year of all the planets. Its day is 58 Earth day, meaning there is a day and half each year! Mercury's surface is crater-filled, much like the Moon's.	<b>No moons</b>	<b>Area:</b> 0.147 Earths <b>Temperature:</b> 180k - 700k
<b>Venus</b> Planet 0.72 AU		Venus is the 2nd planet from the Sun. It is similar to Earth in its size, distance from the Sun, and mass, however its dense atmosphere make the surface temperature and pressure unbearable. It is the hottest planet in the Solar System.	<b>No moons</b>	<b>Area:</b> 0.902 Earths <b>Temperature:</b> 735k
<b>Earth</b> Planet 1 AU		Earth is the 3 <sup>rd</sup> planet from Sun, and is the only known planet in the Universe to contain life.. Earth's axis is tilted, meaning that there are seasons. About 71% of Earth's surface is liquid water, which is very important for life.	<b>The Moon</b>	<b>Area:</b> 510,072,000 km <sup>2</sup> <b>Temperature:</b> 288k
<b>Mars</b> Planet 1.52 AU		Mars is the 4 <sup>th</sup> planet in the Solar System, and the 2nd smallest. It is sometimes nicknamed 'The Red Planet.' Scientists are exploring whether there was once life on Mars.	<b>Phobos and Deimos</b>	<b>Area:</b> 0.284 Earths <b>Temperature:</b> approx. 219k
<b>Ceres</b> Dwarf Planet 2.77 AU		Ceres is the largest object in asteroid belt, which lies in between Mars and Jupiter. It is the only dwarf planet that lies within the orbit of Neptune. It is made up of mostly rock and ice.	<b>No moons</b>	<b>Area:</b> 2,770,000km <sup>2</sup> <b>Temperature:</b> approx. 200k
<b>Jupiter</b> Planet 5.2 AU		Jupiter is the 5 <sup>th</sup> planet from the Sun and by far the largest. Its mass it is 2 and a half times that of all of the other planets in the Solar System put together. It also has the most moons.	<b>67 incl. Ganymede (2018)</b>	<b>Area:</b> 121.9 Earths <b>Temperature:</b> 165k
<b>Saturn</b> Planet 9.58 AU		Saturn is the 6 <sup>th</sup> planet from the Sun, and the second-largest after Jupiter. Like Jupiter, it is a gas giant. The most famous feature of Saturn is its ring system.	<b>62 confirmed incl. Titan (2018)</b>	<b>Area:</b> 83.7 Earths <b>Temperature:</b> 134k
<b>Uranus</b> Planet 19.23 AU		Uranus is the 7 <sup>th</sup> planet from the Sun. Uranus is known as one of two 'ice giants' (with Neptune). Uranus seems to have no storms or clouds.	<b>27 confirmed incl. Miranda (2018)</b>	<b>Area:</b> 15.91 Earths <b>Temperature:</b> 76k
<b>Neptune</b> Planet 30.1 AU		Neptune is the eighth and farthest-known planet from the Sun within the Solar System. It takes Neptune 164.8 Earth years just to complete one orbit around the Sun!	<b>14 confirmed incl. Triton (2018)</b>	<b>Area:</b> 14.98 Earths <b>Temperature:</b> 72k
<b>Pluto</b> Dwarf Planet 39.3 AU		Pluto is a dwarf planet in the Kuiper Belt. It was discovered in 1930, and was considered to be a planet right up until 2006.	<b>5 confirmed incl. Charon (2018)</b>	<b>Area:</b> 0.035 Earths <b>Temperature:</b> : 44k
<b>Haumea, Makemake, Eris</b> Distances vary		These are all dwarf planets beyond Neptune - they are big enough to be shaped by gravity, but not big enough to be named planets.	<b>Haumea has Hi'iaka and Namaka</b>	All are hundreds of times smaller than Earth and are colder than 32k

### Other Bodies in the Solar System

#### Comets



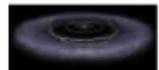
Comets are small, icy, bodies in the Solar System - when they near the Sun, the temperature of comets rise and they release gases, in a process known as outgassing. This produces a visible cloud of gases around the comet (a coma), and sometimes a tail. A famous example is Halley's comet, which passes Earth every 74-79 years. Comets are sometimes called 'shooting stars.'

#### The Asteroid Belt



The asteroid belt is an area between the orbits of Mars and Jupiter, which has lots of differently shaped objects named asteroids. There are four asteroids that are much bigger than the rest - Ceres, Vesta, Pallas, and Hygiea. The asteroid belt is still quite empty: a number of unmanned spacecraft have passed through it without any crashes!

#### The Kuiper Belt



The Kuiper Belt is an area in the outer Solar System, beyond the orbit of Neptune. It is like the asteroid belt in that it contains a number of small bodies formed - however it is far larger (about 20 times as wide). The Kuiper Belt is home to 3 confirmed dwarf planets: Pluto, Haumea, and Makemake and many others that are soon to be confirmed. The belt was named after a Dutch-American explorer named Gerard Kuiper.

#### The Oort Cloud



The Oort Cloud is named after the Dutch astronomer Jan Oort. It is thought to be a cloud of icy bodies that exist far deeper into the Solar System than anything we have seen so far - it is so far away that we don't know if it exists yet! The outer edge of the Oort Cloud is thought to be the boundary of the Solar System - after passing through here, objects are no longer held by the Sun's gravity. Many comets and asteroids are thought to come from here.

#### Human Spaceflight

Since the mid-twentieth century, humans have begun to explore the Solar System. The first human spaceflight was launched by the Soviet Union on 12<sup>th</sup> April 1961. Cosmonaut Yuri Gagarin was onboard. On 21<sup>st</sup> July 1969, Apollo 11 (launched by NASA in the USA) landed Buzz Aldrin and Neil Armstrong on the Moon. More recently, the International Space Station (ISS) has been created in the Earth's orbit. Launched in 1998, it has been constantly manned by humans for over 17 years.



### Timeline of Discovery (not to scale!)

Approx. 2000BC-1000BC - Mercury, Venus, Mars, Jupiter and Saturn are identified.

1610 - Galileo discovers the 'Galilean Moons' of Jupiter: Callisto, Europa, Io, and Ganymede

1700 - People stopped believing that the Universe orbited around the Earth.

1780s - William Herschel discovers Uranus and two moons (+2 Saturn moons).

1846 - Neptune is discovered by Johann Gotfried Galle

1930- Pluto is discovered by Clyde Tombaugh

2006- Pluto is changed from being known as a planet to a dwarf planet.

Famous astronauts and astronomers.	
Sir Isaac Newton	An English scientist, mathematician and astronomer whose discoveries changed the way we think about the Universe. He is most famous for defining the three laws of motion and universal gravitation.
Yuri Gagarin	First astronaut in space on the VOSTOCK 1 spacecraft (1951)
Neil Armstrong	First astronaut on the moon in APOLLO 11 (1969)
Tim Peake	Most recent British astronaut to go into space (2015)

Key Vocab	
<b>Solar System</b>	The collection of eight planets and their moons in orbit round the Sun.
<b>Planet</b>	A spherical mass of solids and gases which spin and orbit the Sun.
<b>Dwarf planet</b>	An celestial body resembling a small planet but lacking criteria to be classed as a planet (Pluto).
<b>Orbit</b>	A curved invisible path that a planet, asteroid, meteorite or comet takes as it goes around something else (e.g. the Sun).
<b>Celestial</b>	A body in the sky or in outer space.
<b>Asteroid</b>	A rock that orbits the Sun. (Meteoroid is the same but smaller)
<b>Moon</b>	Natural satellites which orbit a planet. (Lunar relates to the moon).
<b>Axis</b>	An imaginary, straight line that a planet orbits.
<b>Rotation</b>	To turn around a fixed point (axis).
<b>Atmosphere</b>	A mixture of gases that surround a planet.
<b>Universe</b>	All of space and everything in it including stars, planets and galaxies.
<b>Star</b>	A huge, bright ball of gas held together by gravity.
<b>Comet</b>	A frozen mass of dust and gas orbiting the Sun.
<b>Crater</b>	A huge hole formed by the impact of a meteorite on other space objects.
<b>Gravity</b>	The force by which an object with a large mass pulls an object toward its centre (The planets are kept in the Solar System through gravity).
<b>Satellite</b>	A man-made machine orbiting a body in space that sends signals back to Earth.
<b>Galaxy</b>	A collection of star systems (Earth is in the Milky Way Galaxy).

