SATELLITES IN THE SOLAR SYSTEM

There are many objects in the Solar System: 8 planets, a star (our Sun), over 950,000 asteroids, comets and dwarf planets and that's not mentioning at least 180 moons.

Many of these objects orbit others. Planets, comets and many asteroids are in orbit around the Sun. Moons orbit planets, plus the variety of artificial satellites in orbit around the Earth.

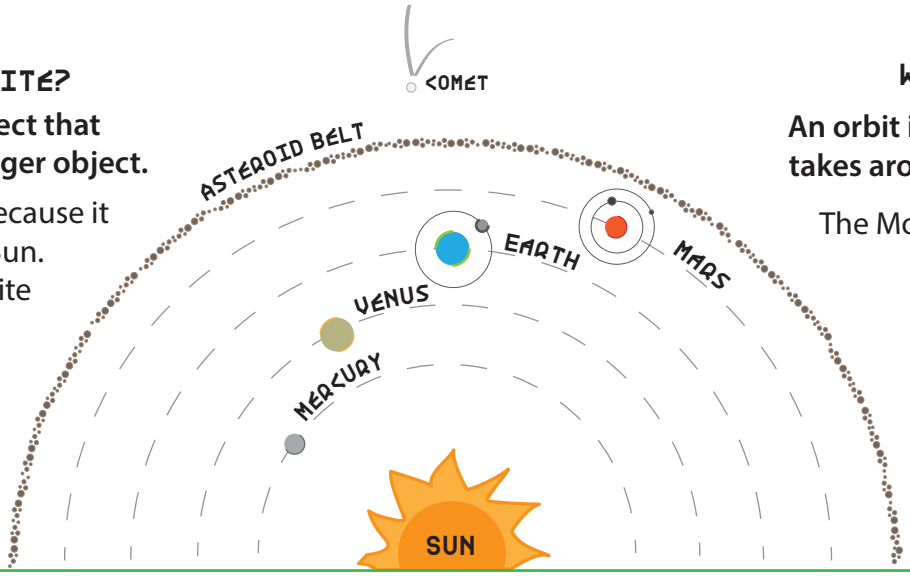
SATELLITES AND ORBITS

The diagram below shows the orbits of the four rocky inner planets in the Solar System, their moons and the asteroid belt.

WHAT IS A SATELLITE?

A satellite is an object that moves around a larger object.

Earth is a satellite because it moves around the Sun. The Moon is a satellite because it moves around the Earth.



WHAT IS AN ORBIT?

An orbit is the path an object takes around another object.

The Moon is in orbit around the Earth, Earth is in orbit around the Sun and the Sun is in orbit around the centre of the Milky Way galaxy.

There are two broad categories of satellite: natural satellites and artifical satellites.

Natural satellites such as the Earth (orbiting the Sun) and the Moon (orbiting the Earth) can be found throughout the Solar System and shouldn't be confused with artificial satellites.

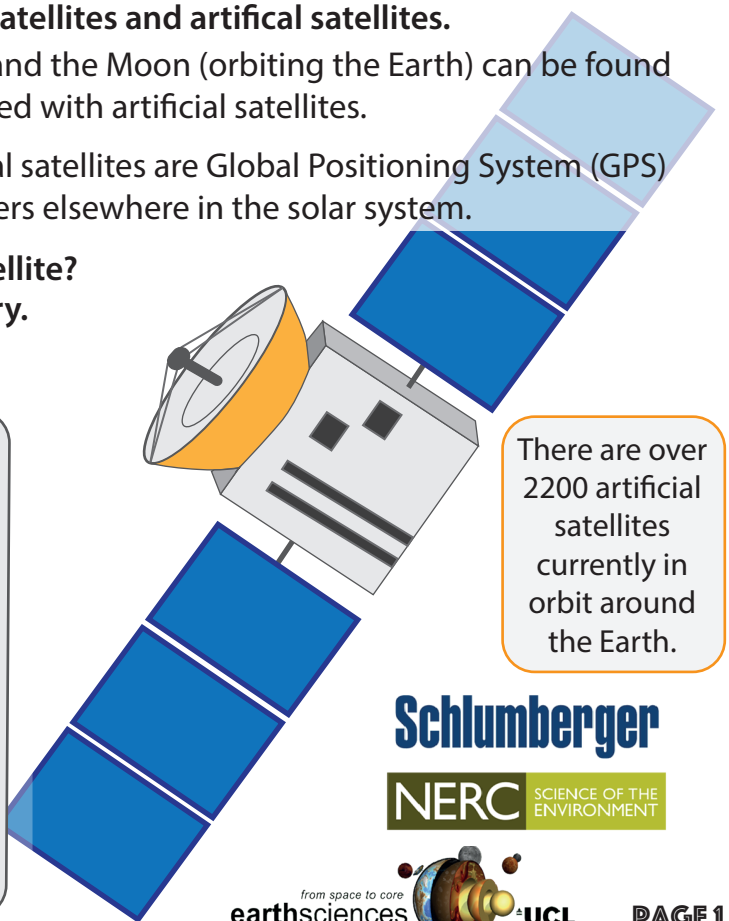
Artificial satellites are 'man-made'. Examples of artificial satellites are Global Positioning System (GPS) satellites currently in orbit around the Earth and orbiters elsewhere in the solar system.

Think you know your artificial from your natural satellite?
Connect the following objects to the correct category.
The first one has been done for you.

ARTIFICIAL SATELLITE

- International Space Station
- The Halley Comet
- Mars' Moon Phobos
- CryoSat
- Pluto
- Sputnik 1

NATURAL SATELLITE



There are over 2200 artificial satellites currently in orbit around the Earth.

EARTH'S NATURAL SATELLITE: THE MOON

Average distance to the Earth: 384,400 km

Temperature range: -248 to 123 °C

Equatorial radius: 1737.5 km

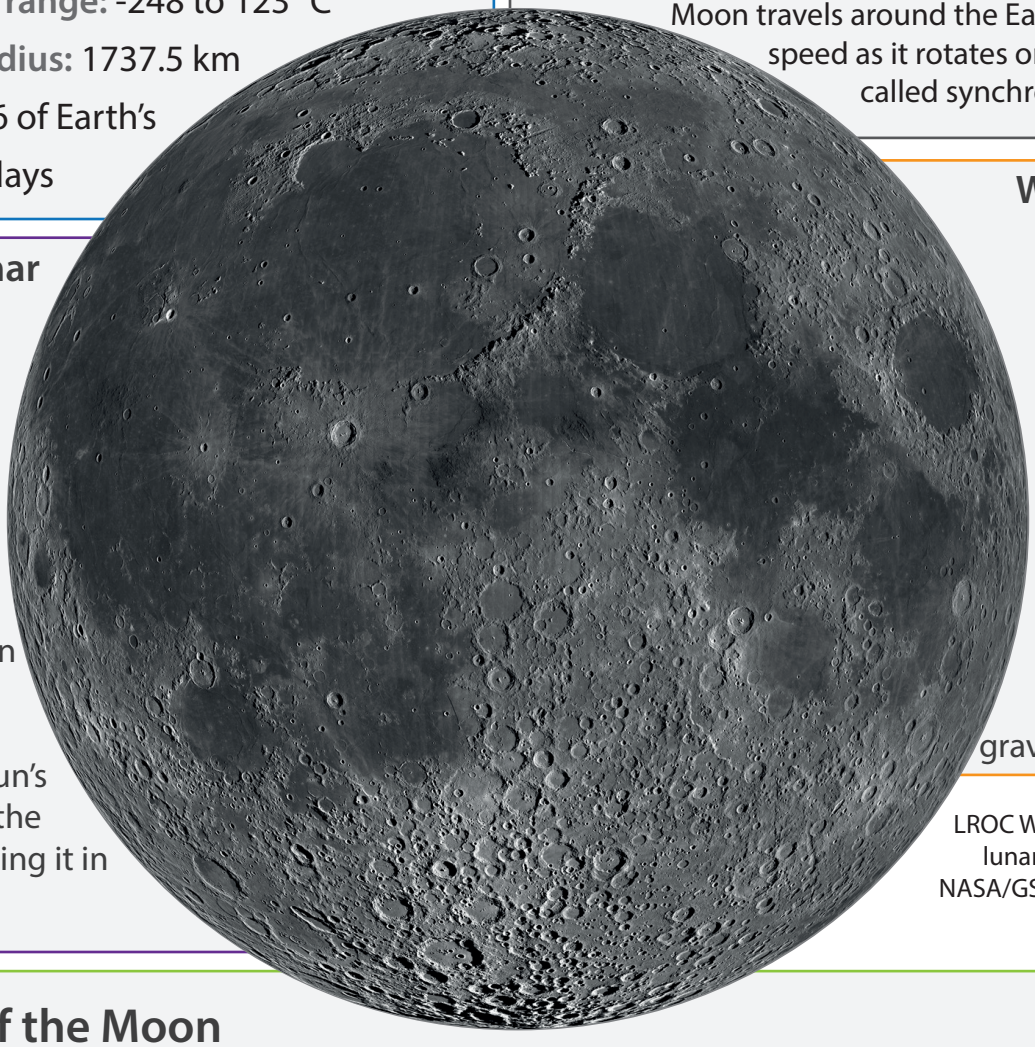
Gravity: 0.166 of Earth's

Orbit: 27.32 days

The Moon has no dark side. Each side is lit by the Sun, but we only see one side of the Moon from Earth. The Moon travels around the Earth at the same speed as it rotates on its axis. This is called synchronous rotation.

What is a lunar eclipse?

A lunar eclipse is when the Moon appears dark. It happens when the Earth passes between the Sun and the Moon, blocking the Sun's light reaching the Moon and leaving it in shadow.



What causes the tides?

The Earth's tides rise and fall twice each day. The tides are caused by the Moon's orbit around the Earth and the Moon's gravitational pull.

LROC WAC mosaic of the lunar nearside [Credit: NASA/GSFC/Arizona State University].

Phases of the Moon

The Moon reflects the light from the Sun. The phases of the Moon (lunar phases) are a result of us viewing the Moon's sunlit appearance as it orbits the Earth

Colour in the moons below to show the eight phases of the Moon.

New Moon | Waxing Crescent | First Quarter | Waxing Gibbous | Full Moon | Waning Gibbous | Last Quarter | Waning Crescent

EARTH'S ARTIFICIAL SATELLITE: SPOTTING THE ISS

The International Space Station (ISS) is 400 km above the Earth's surface and completes an orbit of the Earth every 90 minutes - the astronauts experience 16 sunrises and sunsets everyday.

This means you can spot the ISS most clear evenings from the comfort of your garden or window. The ISS will look like a bright star in the sky that moves quickly from horizon to horizon.

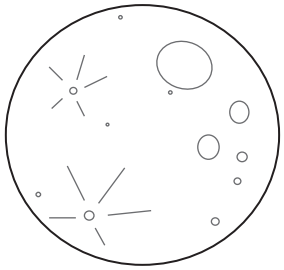
You can find out the right time to look outside by using the ESA Spot the Station app.

A SCALE SATELLITE MODEL

This activity will give you an idea of the approximate size of the Earth, Moon, the International Space Station and their distances from each other.

Earth's Diameter: 12,742 km

Moon's Diameter: 3,474.2 km



The International Space Station is 109 metres measured end to end.

No that's not dust. → ← That's the approx. size of the ISS.

1. The first step is to cut out the shapes.

Each shape represents the approximate size of the Earth, Moon and ISS relative to each other. You can turn this into a 3D model by making spheres with the same diameters e.g. 12.7 cm for the Earth, 3.5 cm for the Moon and the smallest you can find for the ISS.

2. Set up the correct scale.

The distance between the Earth and Moon is: 384,400 km.
The distance between the Earth and ISS is: ~ 400 km.

Place the cut-out Earth on the floor in front of you. Then measure a distance of 384 cm (or 3.84 m). This is how far the Moon is from the Earth. If you wish to add the ISS, place the ISS 0.04 cm from the Earth.

3. Calculate the Sun's scale.

The Earth lies 150.44 million km from the Sun. So to add this to your model you would need to measure a distance of 15,044 cm (or 1504.4 m)!
The Sun's diameter is 696,340 km. How large a picture would you need to create a scale model of the Sun if the scale is 1 cm = 10,000 km?