

YEAR 5 UNIT 1: Out of this World (Earth and Space)

Enquiry Question: What is the Solar System?

Related units: Year 3 Unit 6: We are Astronauts; Year 3 unit 3: How do we see things?

Year 6 unit 4: How does light behave?

Unit overview

National Curriculum Links Year 5: Earth and Space

Children will be taught to describe the movement of the Earth and other planets relative to the sun in the solar system. They will describe the movement of the moon relative to the Earth. They will describe the sun, Earth and moon as approximately spherical bodies and use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. They will be introduced to a model of the sun and Earth that enables them to explain day and night. They will learn that the sun is a star at the centre of our solar system and that it has 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They will understand that a moon is a celestial body that orbits a planet (Earth has 1 moon; Jupiter has 4 large moons and numerous smaller ones). Pupils will be warned that it is not safe to look directly at the sun, even when wearing dark glasses. Pupils should develop their understanding by studying the work of scientist such as Ptolemy, Alhazen and Copernicus. Although Earth and space are not covered in KS1 or lower KS2, children are aware of our sun and be familiar with the names of the planets and how planets move around the sun.

Scientific vocabulary

- Solar System
- Star
- Planet
- Sun
- Centric
- Geocentric
- Heliocentric
- Timeline
- Night-time
- Daytime
- Orbit
- Time zone

Working Scientifically

- Comparing the time of day at different places on the Earth through internet links and direct communication
- Creating simple models of the solar system
- Constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day
- Finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.

Assessment

1. Explain what the Solar System is
2. Name the 8 planets in the Solar system in order of their distance away from the Sun
3. Explain how people's ideas of the Solar System have changed over time
4. Explain how the Earth's movement causes night and day?

Cross-curricular links

English:

- Use Scientific vocabulary

Teacher knowledge

Our Solar System has a large star, the Sun, at its centre, and eight planets and their moons, which orbit the Sun. All planets have almost circular orbits that lie within a nearly flat disc called the ecliptic plane. The vast majority of the system's mass is in the Sun, with most of the remaining mass contained in Jupiter. The planets in order of their distance away from the Sun are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. The four smaller inner planets, Mercury, Venus, Earth and Mars, are mainly composed of rock. The four outer planets, called the 'gas giants', are substantially more massive. The two largest, Jupiter and Saturn are composed mainly of hydrogen and helium. The two outermost planets, Uranus and Neptune, are composed largely of substances with relatively high melting points (compared with hydrogen and helium), called ices. These include water, ammonia and methane. Uranus and Jupiter are often referred to separately as 'ice giants'. The Solar System also contains many other objects such as the Asteroid Belt. This sits between the orbits of the planets Jupiter and Mars. It is made up of thousands of objects too small to be considered planets. Some are no larger than a grain of dust, while others, like Eros, can be more than 160 kilometers across. A few, like Ida, even have their own moons. In addition, some objects, like Pluto, are now classified as dwarf planets.

In medieval times and before, it was commonly accepted that the Earth was flat. Nowadays we have photographic, and other evidence, to show that, like other planets and the moon, the Earth is spherical in shape. The Earth and the Moon both move. The Earth orbits the Sun once every 365 $\frac{1}{4}$ days and spins on its axis once a day. Although when you look up into the sky the Sun seems to move around the Earth, this is an illusion; in fact, the Earth spins and causes night and day. The part of the Earth that faces the Sun is in daylight, and the part that is not facing the Sun is in darkness. Before modern calendars, people used to keep track of the days by watching the phases of the Moon. One full cycle of the Moon's phases is approximately 28 days, which is very close to the amount of time we now know as one month. The Moon orbits the Earth once every 27.32 days, roughly every 28 days. Its regular movement, as seen by its phases, gives rise to a 'month of time'.

Did you know?

- You are travelling on Earth through space at the speed of 107,218kph
- It is impossible to land on Saturn's ring because it consists of millions of pieces of ice, dust and rocks scattered around the planet.
- Some people today still believe that the Earth is flat, the Sun moves around the Earth and we are at the centre of the universe, despite all the evidence that says this is false.
- Galileo believed that the Sun was not just the fixed centre of our Solar System but also the fixed centre of the whole universe. We now know that the Sun is not the centre of the universe and that it does move.
- You do not feel the Earth spin because you, the atmosphere, skyscrapers, and everything else are spinning along with the Earth at the same constant speed.

Misconceptions: Children might think that....

- There is only one Solar System. In fact, there are more than 500 solar systems and more are discovered every year.
- The Earth is at the centre of our solar system. In fact, it is very close to the sun.
- There are stars in our Solar System other than the Sun. In fact, the Sun is the only star.
- All planets have rocky surfaces. Some do, but the outer planets are gas giants. In fact, only some do; the outer planets are gas planets.
- Planets cannot be seen without a telescope. In fact, you can see Mercury, Venus, Mars, Jupiter and Saturn without a telescope.
- The Sun moves around the Earth and causes day and night (the spinning Earth causes it). In fact, the Earth orbits the Sun once every 365 $\frac{1}{4}$ days and spins on its axis once a day.
- We do not always see the same side of the Moon. In fact we do! The Moon revolves on its axis and orbits the Earth so that the same side of the Moon always faces the earth.
- Nighttime is caused because the Sun goes to the back of the Earth. In fact, it is the Earth that moves.

Resources

The universe in a nutshell' – a useful YouTube clip: www.youtube.com/watch?v=kQ3nEY4Alk
www.childrensuniversity.manchester.ac.uk/interactives/science/earthandbeyond/planets/

Animation of how the planets orbit the Sun: www.gunn.co.nz/astrotour

Models of the Solar System: www.bbc.co.uk/schools/gcsebitesize/science/edexcel/visiblelight_solarsystem/ideas_solar_systemrev1.shtml
www.newadvent.org/cathen/04352b.htm
www.catholic.com/tracts/the-galileo-controversy

Phases of the Moon: www.bbc.co.uk/programmes/p00n6zhl Time zone map www.timeanddate.com/time/map