

Substantive concepts (themes)

Universe; matter, energy, solar system; day and night; seasons; Big Bang; gravity; light; atmosphere

Procedural concepts (skills)

ask relevant questions; set up simple practical enquiries, comparative and fair tests; make accurate measurements using standard units, using a range of equipment; gather, record, classify and present data in a variety of ways; record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables; report on findings from enquiries; use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions; identify differences, similarities or changes related to simple scientific ideas and processes; use straightforward scientific evidence to answer questions or to support their findings.

NC Objectives

Core knowledge and vocabulary

Science

Earth and Space (Year 5)

- describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- describe the movement of the Moon relative to the Earth
- describe the Sun, Earth and Moon as approximately spherical bodies
- use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky.

Know that the **Universe** is everything that exists - including **stars, planets** and **galaxies**. Know that the universe was born in a colossal explosion known as the **big bang** around 13.8 billion years ago. This produced two things: **energy** and **matter**. The Universe has no fixed edge and is expanding (getting bigger). Matter is another word for the stuff that everything is made out of. All matter is made up of tiny **particles** called **atoms**. On earth the most common states of matter are **gas, liquid and solids**.

Our galaxy is called the **Milky Way**. The **solar system** is part of the **Milky Way galaxy** and is made up of the sun and anything that **orbits** it. There are 8 planets (**Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune**) and some **dwarf planets**, including **Pluto**. Planets are objects that orbit a star (the Sun). A dwarf planet will orbit a star but will be too small to be planet, or not quite fit the pattern of a normal planet. **Moons** orbit planets and are also known as **natural satellites**. **Artificial satellites** are satellites that humans have built and they mostly orbit the Earth.

Forces (Year 5)

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object

Know that some planets are **rocky** planets and some are **gas** planets. The four rocky planets are Mercury, Venus, Earth and Mars. They are the closest four planets to the Sun.. They are made of rocks and metals. They have a solid surface and a core which is mainly made of iron. The Earth can be split into three layers: the **crust, the mantle** and the **core**. They are much smaller than the gas planets and rotate more slowly.

Light (Year 6)

- recognise that light appears to travel in straight lines
- use the idea that light travels in

Know that in medieval times and before, it was commonly accepted that the Earth was flat and that that the Earth was at the centre of the solar system (**geocentric** model). Know that the Sun, Earth and Moon are **spherical** bodies. Look at scientific evidence for **heliocentric** models including the work by the scientists **Aristotle** and **Galileo**.

Know that **time zones** are imaginary lines called **meridians** which run from the North Pole to the South Pole. There is an imaginary line running through the UK called the **Prime Meridian**. It runs through a

straight lines to explain that objects are seen because they give out or reflect light into the eye

- explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

place in London called **Greenwich**. The Prime Meridian splits the world into eastern and western **hemispheres**. Time in countries to the east of the Prime Meridian is always in front of that in the UK. Time in countries to the west of the Prime Meridian is always behind that of the UK.

Know that the Earth and the Moon both move and that the Earth orbits the Sun once every **365¼ days** (a year) and spins on its **axis** every **24 hours** (one day). The Earth spinning once a day causes **night and day**. As the Earth rotates on its **axis**, the Sun only shines on the side of the Earth that it is facing. This means: it is **daytime** for the parts of the Earth that have the Sun shining on them, it is **night-time** for places that are on the opposite side of the Earth and are in the shade. As it is night in some parts of the world while it is day in other parts, different places in the world have different times. This is why the world is divided into **24 different time zones**. One for each hour in a day.

Know that the **moon** is a natural satellite and it **reflects** the light from the sun. Know that as it orbits the Earth, the Moon **rotates** so we always see the same face. As the Moon's position changes, it appears differently in the sky. Know the **phases** of the moon. The part of the moon facing the sun is lit up. The part facing away from the sun is in darkness. 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. Know that a **solar eclipse** happens when the Moon is directly between the Earth and the Sun, and it casts a shadow on the Earth. A **lunar eclipse** is when the Earth is directly between the Sun and Moon, and it casts a shadow on the moon.

To be able to describe and explain **comets, meteors** and **asteroids**. Asteroids are rocky, airless worlds that orbit our sun, but are too small to be called planets. Comets are cosmic snowballs of frozen gases, rock and dust roughly the size of a small town. Little chunks of rock and debris in space are called meteoroids. They become a meteor when they fall through a planet's **atmosphere**. If they hit the ground, they are called a meteorite.

Know that a **constellation** is a group of stars that, when seen from Earth, form a pattern. The Plough is a constellation which is easy to spot and is part of the Ursa Major constellation. Know how the stars can be used to navigate using the Pole Star to find North.

Know ways in which humans have learnt more about space: **telescopes**, and **manned/unmanned** flights. Know significant space milestones: first animals in space, space race, first moon landing, and Mars rover. Know significant people including: **Tim Peake, Helen Sharman, Neil Armstrong, Buzz Alrin, Yuri Gagarin and Katherine Dorothy**.

Know that **light** travels in **straight lines**. The Sun is the source of energy (heat and light) in our solar system. Light travels from the light **sources** either directly into our eyes or **reflecting** off objects. Because light travels in straight lines, when it hits an object, it is blocked. It can't bend around the object so it casts a **shadow**. Know how the position of the earth in relation to the sun affects the shadow cast.

Know that **gravity** is a **force** that causes planets and satellites to circle an object. It acts towards the centre

of the orbit. The strength of the force of gravity between two objects depends on their mass and how far apart the objects are. **Black holes** are areas of the universe where gravity is so strong that nothing can escape from them – not even light. The force of gravity from the Moon causes tides on Earth. Know the scientist **Isaac Newton**. Know that force is measured in **Newtons**.