Knowledge Organiser

Subject - Science	Topic name - Animals including humans	Year group 5	Term - Summer

Prior Knowledge

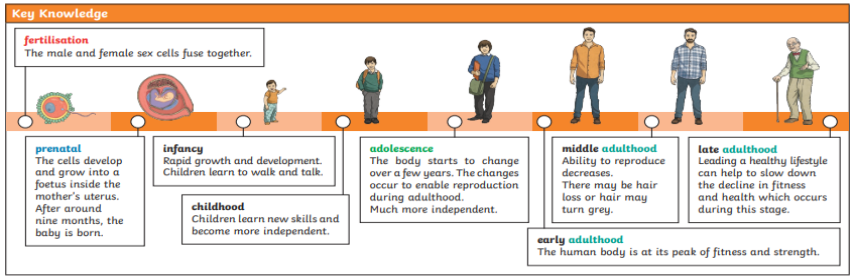
Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)

Skills to be taught

Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Identifying scientific evidence that has been used to support or refute ideas or arguments
Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
Using test results to make predictions to set up further comparative and fair tests

Key Vocabulary	
fertilisation	The process of the male and female sex cells fusing together.
prenatal	The stage of development from the time of fertilisation to the time of birth.
gestation	The process or time when prenatal development takes place before birth.
reproduce	To produce young.
asexual reproduction	A process where one parent produces new life.
sexual reproduction	A process where two parents – one male and one female – are required to produce new life.
life cycle	The changes a living thing goes through, including reproduction.

Key Vocabulary	
adolescence	The social and emotional stage of development between childhood and adulthood.
puberty	The physical stage of development between childhood and adulthood.
menstruation	When the female body discharges the lining of the uterus. This happens approximately once a month.
adulthood	The stage of development when a human is fully grown and mature.
life expectancy	The length of time, on average, that a particular animal is expected to live.



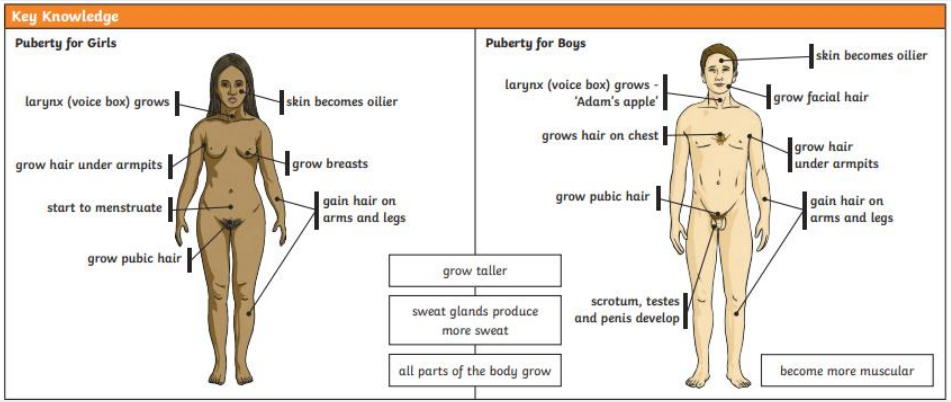
Key Knowledge

When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce. This needs to be taught alongside PSHE. The new statutory requirements for relationships and health education can be found below:

- statutory guidance on Physical health and mental wellbeing (primary and secondary).

Other useful guidance includes:

- Joint briefing on teaching about puberty in KS2 from PHSE Association and Association for Science Education
- Briefing on humans development and reproduction in the Primary Curriculum from PHSE Association and Association for Science Education.



Possible experiences

This unit is likely to be taught through direct instruction due to its sensitive nature, although children can carry out a research enquiry by asking an expert e.g. school nurse to provide answers to questions that have been filtered by the teacher.

Knowledge Organiser

Subject - Science	Topic name - Earth and space	Year group 5	Term - Autumn

Prior Knowledge

Observe changes across the four seasons. (Y1 - Seasonal changes)
Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes)

Skills to be taught

Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Identifying scientific evidence that has been used to support or refute ideas or arguments
Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
Using test results to make predictions to set up further comparative and fair tests

Key Knowledge

The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes 365¼ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical.

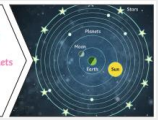
Key Vocabulary

orbit	To move in a regular, repeating curved path around another object.
rotate	To spin. E.g. Earth rotates on its own axis.
axis	An imaginary line that a body rotates around. E.g. Earth's axis (imaginary line) runs from the North Pole to the South Pole.
geocentric model	A belief people used to have that other planets and the Sun orbited around Earth.
heliocentric model	The structure of the Solar System where the planets orbit around the Sun.
astronomer	Someone who studies or is an expert in astronomy (space science).

Key Vocabulary

Sun	A huge star that Earth and the other planets in our solar system orbit around.
star	A giant ball of gas held together by its own gravity.
moon	A natural satellite which orbits Earth or other planets.
planet	A large object, round or nearly round, that orbits a star.
sphere	A round 3D shape in the shape of a ball.
spherical bodies	Astronomical objects shapes like spheres.
satellite	Any object or body in space that orbits something else, for example: the Moon is a satellite of Earth.

Geocentric model
Years ago people believed that planets moved around the Earth.

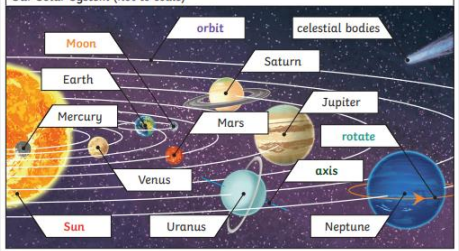


Pluto used to be considered a planet but was reclassified as a dwarf planet in 2006.

Key Knowledge

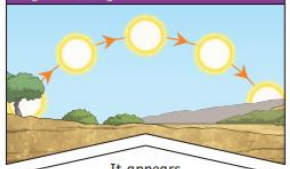
Mercury, Venus, Earth and Mars are rocky planets. They are mostly made up of metal and rock. Jupiter, Saturn, Uranus and Neptune are mostly made up of gases (helium and hydrogen) although they do have cores made up of rock and metal.

Our Solar System (not to scale)



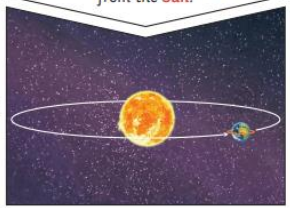
The Moon orbits Earth in an oval-shaped path while spinning on its axis. At various times in a month, the Moon appears to be different shapes. This is because as the Moon rotates round Earth, the Sun lights up different parts of it.

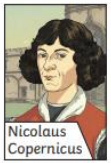
Key Knowledge



It appears to us that the Sun moves across the sky during the day but the Sun does not move at all. It seems to us that the Sun moves because of the movements of Earth.

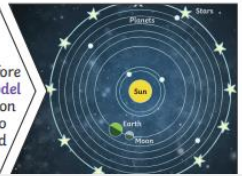
Earth rotates (spins) on its axis. It does a full rotation once in every 24 hours. At the same time that Earth is rotating, it is also orbiting (revolving) around the Sun. It takes a little more than 365 days to orbit the Sun. Daytime occurs when the side of Earth is facing towards the Sun. Night occurs when the side of Earth is facing away from the Sun.





Nicolaus Copernicus

The work and ideas of many astronomers (such as Copernicus and Kepler) combined over many years before the idea of the heliocentric model was developed. Galileo's work on gravity allowed astronomers to understand how planets stayed in orbit.



Possible experiences

Use secondary sources to help create a model e.g. role play or using balls to show the movement of the Earth around the Sun and the Moon around the Earth.
Use secondary sources to help make a model to show why day and night occur.
Make first-hand observations of how shadows caused by the Sun change through the day. Make a sundial. Research time zones. Consider the views of scientists in the past and evidence used to deduce shapes and movements of the Earth, Moon and planets before space travel.

Knowledge Organiser

Subject - Science	Topic name - Forces	Year group 5	Term - Summer

Prior Knowledge

Compare how things move on different surfaces. (Y3 - Forces and magnets) Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)
Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets) Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)
Describe magnets as having two poles. (Y3 - Forces and magnets)
Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)

Key Vocabulary	
friction	A force that acts between two surfaces or objects that are moving, or trying to move, across each other.
air resistance	A type of friction caused by air pushing against any moving object.
water resistance	A type of friction caused by water pushing against any moving object.
buoyancy	An upward force that a liquid applies to objects.
streamlined	When an object is shaped to minimise the effects of air or water resistance.
mechanism	Parts which work together in a machine. Examples of mechanisms are pulleys, gears and levers.

Key Vocabulary	
forces	Pushes or pulls.
gravity	A pulling force exerted by the Earth (or anything else which has mass).
Earth's gravitational pull	The pull that Earth exerts on an object, pulling it towards Earth's centre. It is the Earth's gravitational pull which keeps us on the ground.
weight	The measure of the force of gravity on an object.
mass	A measure of how much matter (or 'stuff') is inside an object.

Possible experiences

Investigate the effect of friction in a range of contexts e.g. trainers, bathmats, mats for a helter-skelter. Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water and pulling shapes, such as boats, along the surface of water. Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats. Explore how levers, pulleys and gears work. Make a product that involves a lever, pulley or gear. Create a timer that uses gravity to move a ball. Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.

Skills to be taught

Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
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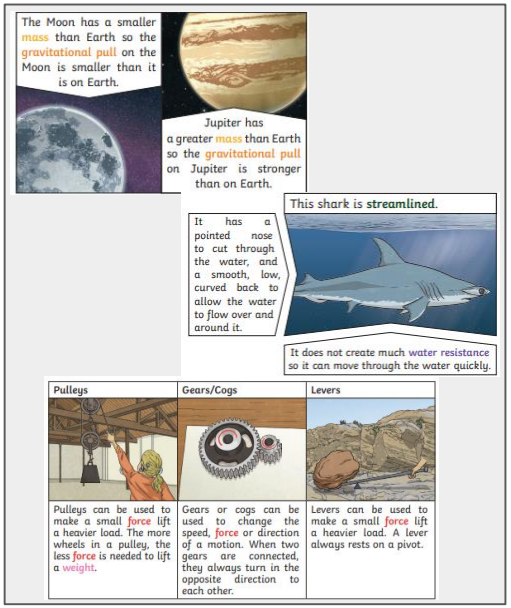
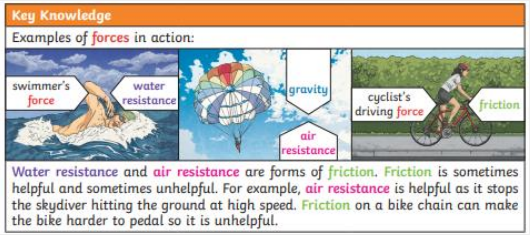
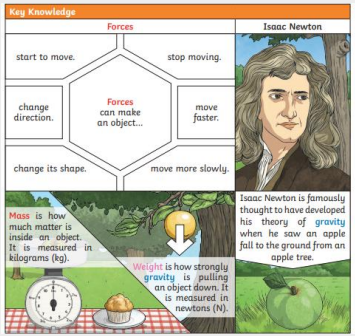


Key Knowledge

A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.
Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object.
A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.





Knowledge Organiser

Subject - Science	Topic name - Living things and their habitats	Year group 5	Term - Summer

Prior Knowledge

Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)
Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)

Skills to be taught

Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
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Key Knowledge

As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis.

Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.

Key Vocabulary	
asexual reproduction	One parent is needed to create an offspring, which is an exact copy of the parent.
fertilise	The action of fusing the male and female sex cells in order to develop an egg.
gestation	The length of a pregnancy.
life cycle	The journey of changes that take place throughout the life of a living thing including birth, growing up and reproduction.
metamorphosis	An abrupt and obvious change in the structure of an animal's body and their behaviour.
pollination	The transfer of pollen to a stigma to allow fertilisation.
reproduction	The process of new living things being made.
sexual reproduction	Two parents are needed to make offspring which are similar but not identical to either parent.

Pictures/maps/images

Humans develop inside their mothers and are dependent on their parents for many years until they are old enough to look after themselves.

Amphibians such as frogs are laid in eggs then, once hatched, go through many changes until they become an adult.

Some animals, such as butterflies, go through metamorphosis to become an adult.

Birds are hatched from eggs and are looked after by their parents until they are able to live independently.

Some living things, such as plants, contain both the male and female sex cells. In others, such as humans, they contain either the male or female sex cell.

Reproduction in mammals

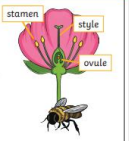
Mammals use sexual reproduction to produce their offspring.

- The male sex cell, called the sperm, fertilises the female sex cells.
- The fertilised cell divides into different cells and will form a baby with a beating heart.
- The baby will grow inside the female until the end of the gestation period when the baby is born.

Echidnas and platypus are mammals but they lay eggs rather than giving birth to live young.

Plants

Most plants contain both the male sex cell (pollen) and female sex cell (ovules), but most plants can't fertilise themselves. Wind and insects help to transfer pollen to a different plant. The pollen from the stamen of one plant is transferred to the stigma of another. The pollen then travels down a tube through the style and fuses with an ovule.



Some plants, such as strawberry plants, potatoes, spider plants and daffodils use asexual reproduction to create a new plant. They are identical to the parent plant.

Possible experiences

Use secondary sources and, where possible, first-hand observations to find out about the life cycle of a range of animals.
Compare the gestation times for mammals and look for patterns e.g. in relation to size of animal or length of dependency after birth.
Look for patterns between the size of an animal and its expected life span.
Grow and observe plants that reproduce asexually e.g. strawberries, spider plants, potatoes.
Take cuttings from a range of plants e.g. African violet, mint.
Plant bulbs and then harvest to see how they multiply.
Use secondary sources to find out about pollination.

Knowledge Organiser

Subject - Science	Topic name - Properties and changes of materials	Year group 5	Term - Spring

Prior Knowledge

Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets) Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter) Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). (Y4 - States of matter) Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)

Skills to be taught

Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
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Key Knowledge

Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.

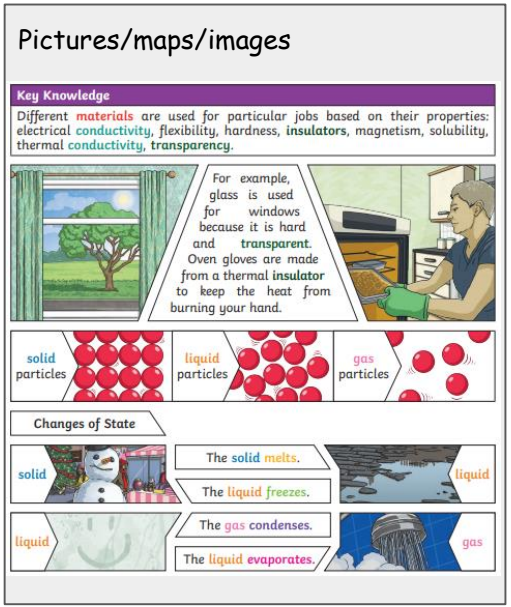
Mixtures can be separated by filtering, sieving and evaporation.

Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.

Key Vocabulary

materials	The substance that something is made out of, e.g. wood, plastic, metal.
solids	One of the three states of matter. Solid particles are very close together, meaning solids, such as wood and glass, hold their shape.
liquids	This state of matter can flow and take the shape of the container because the particles are more loosely packed than solids and can move around each other. Examples of liquids include water and milk.
gases	One of the three states of matter. Gas particles are further apart than solid or liquid particles and they are free to move around. Examples of gases are oxygen and helium.
melting	The process of heating a solid until it changes into a liquid.
freezing	When a liquid cools and turns into a solid.
evaporating	When a liquid turns into a gas or vapour.
condensing	When a gas, such as water vapour, cools and turns into a liquid.

Pictures/maps/images



Possible experiences

Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat. Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate. Investigate rates of dissolving by carrying out comparative and fair test.
Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture. Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning.
Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced?
Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton).