

Y5 SCIENCE KNOWLEDGE - ORGANISER AUTUMN 1: WHAT IS THE SOLAR SYSTEM AND HOW DOES IT WORK?

THRESHOLD CONCEPT: PHYSICS – UNDERSTANDING THE EARTH'S MOVEMENT IN SPACE

Key Vocabulary			
asteroid	a small rocky body orbiting the sun.	moon	the Moon is Earth's only natural satellite and the fifth largest moon in the solar system.
axis	an imaginary line about which a body rotates.	orbit	an orbit is a regular, repeating path that one object in space takes around another one.
celestial body	A natural object which is located outside of Earth's atmosphere, such as a comet, an asteroid, the Moon, a planet, the Sun, or a star.	Astronomer	is a scientist in the field of astronomy - they observe astronomical objects such as stars, planets, moons, comets and galaxies.
dwarf planet	A celestial body but cannot be categorised as a planet due to the relative small size.	solar system	a collection of planets, moons, asteroids, comets, dust and gas that orbit our local star, the sun.
geocentric	a model that suggests the Earth is at the central point.	star	a luminous ball of gas, mostly hydrogen and helium, held together by its own gravity.
heliocentric	a model that suggests the Sun is at the central point.	rotate	an object's spinning motion about its own axis.
elliptical path	an object moving around another object in an oval shaped path.	gravitational pull	the force of attraction that tends to draw together any two objects in the universe.

The solar system – our solar system consists of our star (the sun) and everything bound to it by gravity - eight planets and their moons, dwarf planets, millions of comets, asteroids and meteoroids.

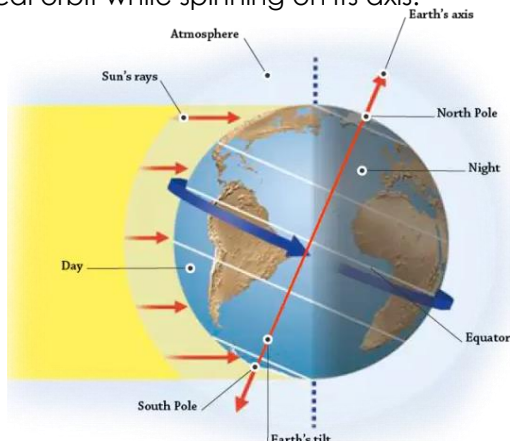
Beyond our solar system, astronomers have discovered thousands of planetary systems orbiting other stars in the Milky Way.

The earth orbits the Sun. It takes just over 365 days to make one complete orbit. That is one year. As the earth orbits the Sun it is also rotating (spins) on its axis. It takes 24 hours to make one complete rotation.

The eight planets revolving around the Sun in a sequence are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.

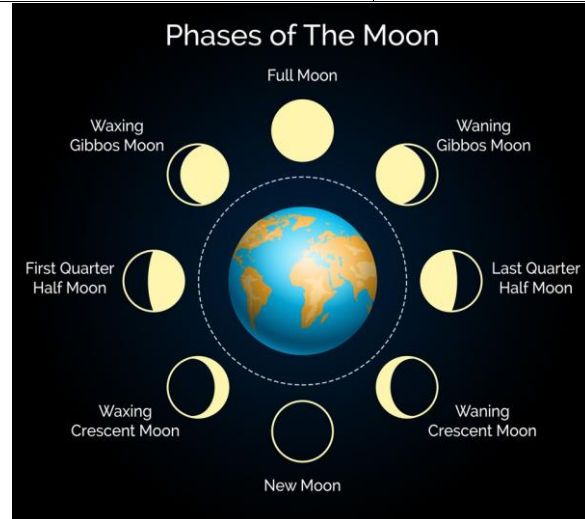
Mercury, Venus, Earth and Mars are rocky planets. They are mostly made up of rock and metal. Jupiter, Saturn, Uranus and Neptune are mostly made up of gases (helium and hydrogen) although they do have cores made of rocks and metals.

Daytime occurs when the side of the Earth is facing the Sun. Night occurs when the side of the Earth is facing away from the sun. The moon orbits the Earth in an elliptical orbit while spinning on its axis.

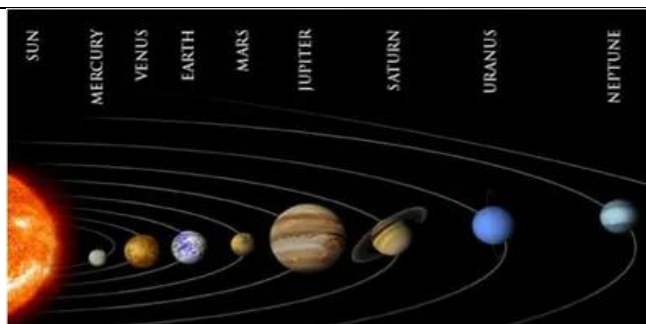


Super Scientist

As a doctor, engineer, and NASA astronaut, Mae Jemison has always reached for the stars. In 1992, Jemison became the first African American woman to travel in space.



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 the Earth, the Sun lights up different parts of it.



Y5 SCIENCE KNOWLEDGE - ORGANISER AUTUMN 2: WHY ARE THE PROPERTIES OF MATERIALS IMPORTANT?

THRESHOLD CONCEPT: CHEMISTRY – TO INVESTIGATE MATERIALS

Key Vocabulary

magnetic	capable of being magnetised or attracted by a magnet.	solution	is made when one substance dissolves into another.
insulator	a material which does not easily allow heat and/or electricity to pass through it.	insoluble	cannot be dissolved, especially in water.
electrical conductor	a material or device with allows electricity to carry through.	dissolve	when something solid mixes with a liquid and becomes part of the liquid.
thermal conductor	a material or device which allows heat to carry through.	soluble	able to be dissolved, especially in water.
irreversible change	cannot be reversed back to its original state.	reversible change	can be reversed back to its original state.

Different materials are used for particular jobs based on their properties: electrical conductivity, flexibility, hardness, insulators, magnetism, solubility, thermal conductivity & transparency

Materials can be grouped based on their properties using more complex vocabulary.

Magnetic



Transparent



Permeable



Soluble



Insoluble



Impermeable



Flexible



Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation.

When a mixture cannot be separated back into the original components, this is called an irreversible change. Examples of this include when materials burn or mixing bicarbonate of soda with vinegar.

Key Knowledge

Reversible changes, such as mixing and dissolving solids and liquids together, can be reversed by:

Sieving	Filtering	Evaporating
Smaller materials are able to fall through the holes in the sieve, separating them from larger particles.	The solid particles will get caught in the filter paper but the liquid will be able to get through.	The liquid changes into a gas, leaving the solid particles behind.

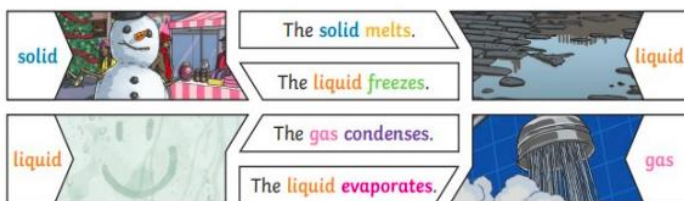
Super Scientist

Leo Baekeland

Belgian chemist Leo Baekeland pioneered the first fully synthetic plastic in 1907. His invention, which he would christen Bakelite, combined two chemicals, formaldehyde and phenol, under heat and pressure.



Changes of State



What is dissolving?

When the particles of a solid mix with the particles of a liquid, this is called dissolving. The result is a solution. Materials that dissolve are soluble. Materials that do not dissolve are insoluble.

What are thermal insulators and conductors?

Materials which are good thermal conductors allow heat to move through them easily.

Thermal conductors are used to make items that require heat to travel through them easily, such as a saucepan which requires heat to travel through to cook food.

Thermal insulators do not let heat travel through them easily. Examples of thermal insulators include woollen clothes and flasks for hot drinks.

Can materials be separated after they have been mixed?

Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.

Reversible Changes



In a reversible change a material turns into something that looks and feels different. But then it can be changed back to its original form.

Y5 SCIENCE KNOWLEDGE - ORGANISER SPRING 1: WHAT IS THE CIRCLE OF LIFE?
THRESHOLD CONCEPT: BIOLOGY – INVESTIGATE LIVING THINGS

Key Vocabulary			
life cycle	the series of changes in the life of an organism including reproduction.	amphibian	a diverse class of vertebrates that are typically four-limbed and cold-blooded.
reproduce	the biological process by which new individual organisms – "offspring" – are produced from their "parent" or parents.	pollination	the transfer of pollen from a male part of a plant to a female part of a plant to produce seeds.
metamorphosis	striking change of form or structure in an individual after hatching or birth.	seed dispersal	the way seeds get away from the parent plant to a new place.
embryo	the early stage of development of a multicellular organism.	germination	the process by which seeds begin to grow into plants.
asexual	reproduction which involves only one parent	fertilisation	a male's sperm and a female's egg join together.
live young	animal gives birth to babies and does not lay eggs	sustainable	a process, resource or state can be maintained at a certain level for as long as is needed.

Life cycle, in biology, is the series of stages or changes that an organism goes through from the beginning of its life until death.
Some life cycles have more in common than others but all animal life cycles include the same main stages in some form: birth, growth, reproduction, aging, and death.

- Mammals** give birth to live young • produce milk to feed their babies • warm blooded • vertebrates • have hair of fur • young look like small versions of the parents.
- Amphibians** females lay thousands of eggs in water • young looks very different to the adults • start life in water breathing using gills • undergo metamorphosis • develop lungs to breathe air as an adult • have cold, jelly-like eggs.
- Birds** - female lays an egg with the embryo inside • egg is incubated by parents • when strong enough the bird hatches • have two wings and two legs • lay eggs with hard shells • most learn to fly, but not all.
- Insects** - females lay thousands of eggs • young look completely different to adult • undergo a metamorphosis inside the pupa.

Plants
Sexual reproduction follows a cycle-like pattern. Flowers come from seeds, and they create seeds too. All flowering plants go through the following life cycle – germination, pollination, fertilisation and dispersal.

Some plants can also reproduce without an egg cell being fertilised to produce a seed. Instead, these plants produce an identical copy of themselves. This is called **asexual reproduction**.

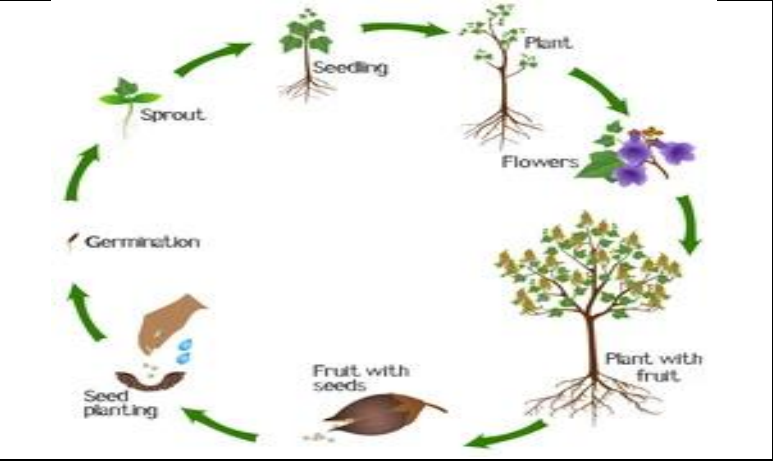
Super Scientists
Jane Goodall, a behaviourist, is best known for her 60 year research on social interactions of wild chimpanzees.

Sir David Attenborough, a naturalist, who has dedicated his life to the study of natural history.



Gestation periods
Smaller animals normally have a shorter gestation period than larger animals. Larger animals tend to produce larger offspring and more developed infants will typically require a longer gestation period. For example, a mouse's gestation period is around 20 days and an African elephant's is 645 days.

Gestation Periods	
Species	Days
Asian Elephant	645
Cow	284
Human	266
Chimpanzee	227
Black Bear	210
Lion	108
Dog	63
Rabbit	33



Y5 SCIENCE KNOWLEDGE - ORGANISER SPRING 2: WHAT ARE FORCES AND HOW DO THEY WORK?

THRESHOLD CONCEPT: PHYSICS - UNDERSTAND MOVEMENT, FORCES AND MAGNETS

Key Vocabulary

force	A push or a pull. A force is exerted on one object by another	mechanism	a collection of moving parts performing a complete movement often part of a large machine.
friction	the force resisting the movement of an object when sliding against another surface.	gears	a rotating machine part having cut teeth.
gravity	the attraction of matter towards the centre of the earth.	levers	a rigid bar that pivots about one point and that is used to move an object.
gravitational pull	the amount of pull towards the centre of the earth. The more mass an object has, the stronger it's gravitational pull	pulleys	a wheel on an axle or shaft that is designed to support movement and change of direction of a cable or belt.
air resistance	air resistance is a kind of friction that occurs between air and another object.	cog	one of the teeth on a wheel or gear.
aerodynamic	the movement of air over an object e.g. air over an aeroplane's wings which creates the lifting force needed to keep the aeroplane in the air.	weight	the measurement of the pull of gravity on an object.
buoyancy	buoyancy or upthrust, is an upward force exerted by a fluid that opposes the weight of an object in or on water.	mass	A measurement of the amount of matter something contains.

What are forces?

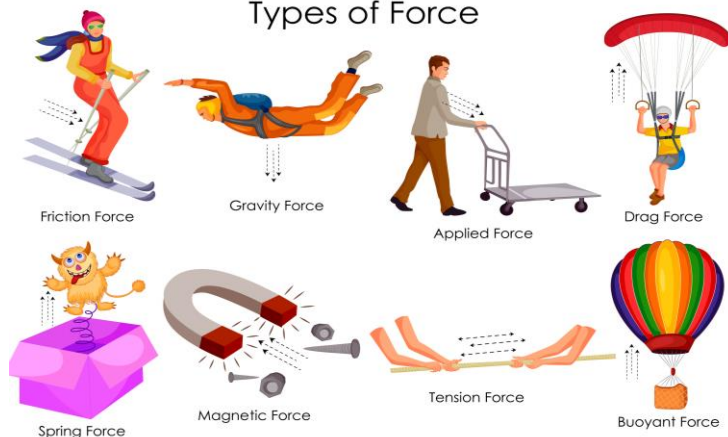
There are two types of forces – those that work at a distance and those that are in contact. Gravity and magnetism work at a distance, whereas friction, air resistance and water resistance work in contact. If an object is stationary or moving at a constant speed, then the forces acting on it are balanced.

Friction is the force that exists between the surfaces of two objects that are in contact with each other, when at least one of them is moving. If the surface is rough it has greater frictional force.

Air resistance is the force that opposes the movement of objects in the air. When objects move through air, the air pushes against them and slows them down. Objects with greater surface area create more air resistance because they have to push more air out of the way. Air resistance – a type of friction between air and another material. Aeroplanes and cars are streamlined so that they can move through the air as easily as possible.

Gravity is the force that pulls things to the ground. Gravity also holds Earth and other planets in their orbits around the sun.

Types of Force



Sir Isaac Newton

Born- 4 January 1643

Died- 31 March 1727

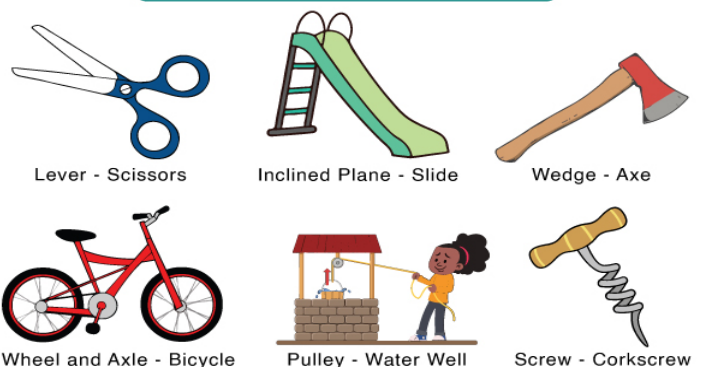
Sir Isaac Newton was an English mathematician, physicist and astronomer, who is considered by some as one of the most important scientists of all time. One of his achievements was developing the theory of gravity.



Simple Machines also known as mechanisms

Levers, pulleys and gears are simple machines, or mechanisms. They are devices that make things easier to do.

Simple Machine Examples



Types of mechanisms

Pulleys – they are used to reduce the amount of force needed to lift a load. The more wheels in a pulley the less force is needed to lift the weight.

Gears or cogs – are used to change speed, direction or force of a motion. When 2 gears are connected they always turn in the opposite direction to one another.

Levers – can be used to make a small force lift a lighter load. A lever always rests on a pivot or fulcrum.

Y5 SCIENCE KNOWLEDGE - ORGANISER SUMMER 1: WHAT HAPPENS TO OUR BODIES AS WE GET OLDER?

THRESHOLD CONCEPT: BIOLOGY – UNDERSTAND ANIMALS AND HUMANS

Key Vocabulary

life expectancy	a statistical measure of the average time an organism is expected to live.	foetus	the unborn offspring that develops from an animal embryo.
gestation periods	the amount of time that a baby spends inside its mother's womb before it is born.	infancy	the early stage in the development or growth of something.
puberty	the time when the body matures from that of a child to that of an adult.	childhood	the state or period of being a child.
mammals	any animal of which the female feeds her young on milk from her own body. Most mammals give birth to live young, not eggs.	adolescence	the time in a young person's life when physical and emotional changes leading to adulthood are happening.
development	a new stage in a changing situation.	young adulthood	generally a person in the years following adolescence
old age	the period in a person's life when he or she is old/later stages of life	adulthood	the period in the human lifespan in which full physical and intellectual maturity have been attained.

All living things have a beginning, and they all must die. What happens between birth and death varies from one kind of living thing to another. Most living things have one thing in common— they begin life as a tiny single cell.

The human life span can be split into a number of stages: infancy, childhood, adolescence, young adulthood, adulthood and old age. The actual length of these stages varies across different cultures and time periods.

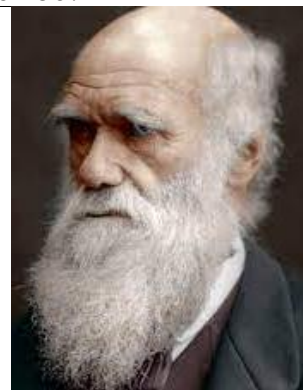
Humans, like all mammals, give birth to live young. The fertilised egg stays inside the female and develops in the womb. The baby is linked to the mother via a placenta, which gives the baby nutrients and oxygen and takes away waste products. The amount of time it takes for a baby to develop is called the gestation period. In humans this is roughly 9 months (266 days).

Human babies are highly dependent on their parents for a long time after birth. They start to walk at around 1 year old and learn to talk at about 18 months old. They grow rapidly. By the age of five a child can walk, talk and feed itself, but is still very dependent on its parents.

Super scientist Charles Darwin

1809-1882

He is most famous for his work on natural selection - the idea that all species of life have evolved over time from common ancestors.

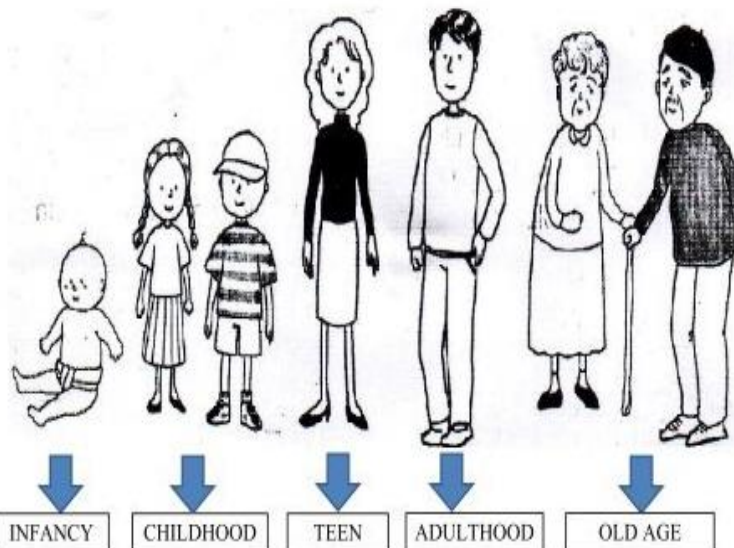
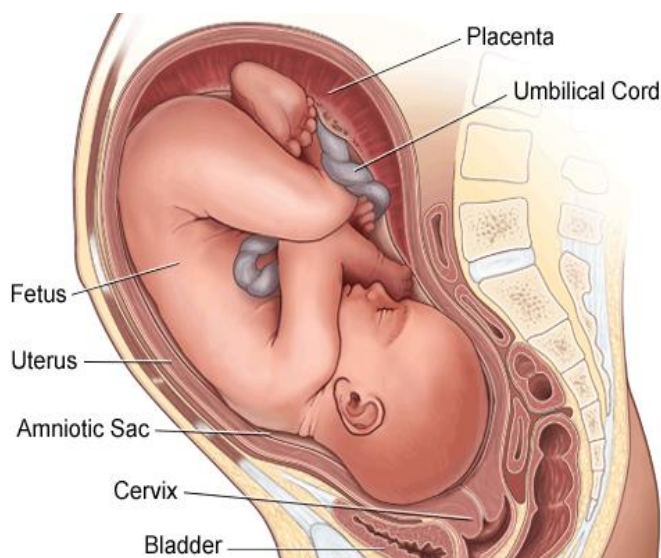


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Y5 SCIENCE KNOWLEDGE - ORGANISER SUMMER 2: HOW DO SCIENTISTS WORK IN THE REAL WORLD?

THRESHOLD CONCEPT: WORKING SCIENTIFICALLY

Key Vocabulary

Fingerprint	an impression left by the friction ridges of a human finger.	mechanism	a collection of moving parts performing a complete movement often part of a large machine.
DNA	a long molecule in the body that contains the genetic code.	gears	a rotating machine part having cut teeth.
forensic scientist	The attraction of matter towards the centre of the earth.	levers	a rigid bar that pivots about one point and that is used to move an object.
microscope	an instrument with lenses that makes small objects look bigger.	pulleys	a wheel on an axle or shaft that is designed to support movement and change of direction of a cable or belt.
evidence	information that gives proof or leads to a conclusion.	cog	one of the teeth on a wheel or gear.

There are many different kinds of scientist who work in different ways.

This topic looks at the discoveries of famous scientists, the methods forensic scientists use and the various ways scientists tell others about new discoveries.

Accidental discoveries are an important part of science.

In recent years many more sophisticated forensic methods have been devised, the most important of which is DNA profiling. Although 99.9% of human DNA sequences are the same in every person, enough of the DNA is different to distinguish one individual from another, unless they are identical twins. The power of this can be seen in the use of DNA to solve 'cold case' crimes which have been left unsolved for many years.

DNA is made up of two strands joined together by four different chemicals which are bases.



DNA

— = A
— = T
— = C
— = G

— = Phosphate backbone

The shape of DNA is called a **double helix**.

Super Scientist Stephanie Kwolek

While trying to find a lighter material for car tyres, Stephanie created a very hard, but light, material called Kevlar. This invention was used in cars but also in bulletproof vests and is still used to protect the police and armed forces today.



Since the early 20th century, fingerprint detection and analysis has been one of the most common and important forms of crime scene forensic investigation. More crimes have been solved with fingerprint evidence than by any other method. The technique relies on the fact that every person's fingerprint is different and can be identified by comparing the three basic patterns of loop, whorl and arch, which constitute 60–65%, 30–35% and 5% of all fingerprints respectively.

Blood, footprints, hair, fibres and teeth Crime solvers marks can all leave behind vital clues which can be used to identify an individual .



loop



whorl



arch