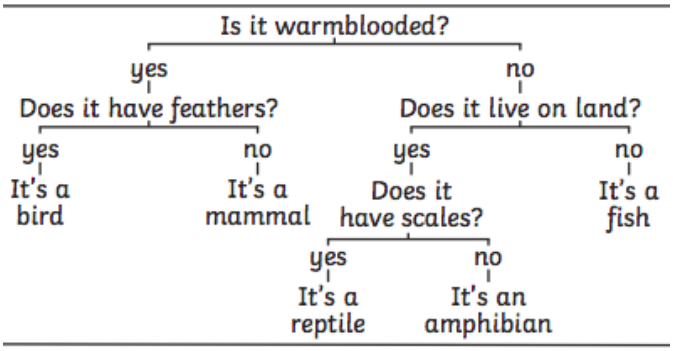
Y6 SCIENCE KNOWLEDGE ORGANISER - AUTUMN 1: CLASSIFYING CRITTERS
THRESHOLD CONCEPT: BIOLOGY – INVESITGATE LIVING THINGS

Key Vocabulary			
flora	Living things that are plants.	fauna	Living things that are animals.
invertebrate	Animal without a backbone.	vertebrate	Animal with a backbone.
mammal	An animal that gives birth to live young.	insect	An animal with six legs
reptile	An animal with an internal skeleton that lays eggs, but lives on land.	fish	An animal with an internal skeleton that lives in water and has gills.
bird	An animal that flies and has an internal skeleton.	amphibian	An animal with an internal skeleton that lives both in and out of water.
key	A key is a series of questions about the characteristics of living things. A key is used to identify a living thing or decide which group it belongs to by answering 'yes' or 'no' questions	species	Usually defined as individuals that can reproduce (have children).

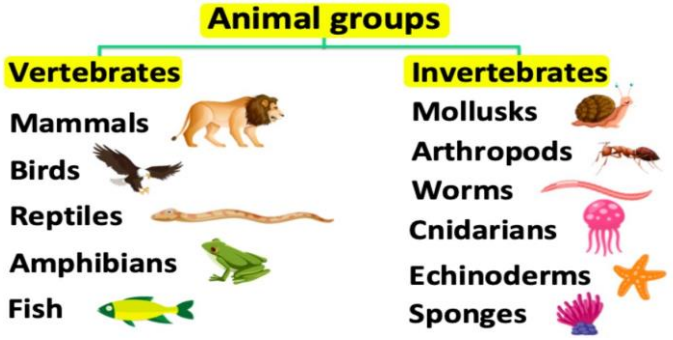
Living things are divided into groups, with members of each group having similar features. The obvious first grouping would be whether something was an animal or a plant, which was covered in Year 4. Here we will consider the other three groups of fungus, monera (microbes) or single-celled organism called protists.

Each time we divide up the living things by particular characteristics, the groups become smaller until we end up with the organism being 'identified'. This process of grouping in smaller and smaller groups lead us also to look back and see what the ancestors or precedents of an organism are.

Scientists, called **Taxonomists**, sort and group living things according to their similarities and differences.



The animal kingdom can be divided into two broad groups based on whether they have a backbone (vertebrate) or not (invertebrate).
Vertebrates are animals that have a backbone inside their body. The major groups include fish, amphibians, reptiles, birds and mammals.
Invertebrates are animals that **don't** have a **backbone**. Some have soft bodies, like worms, slugs and jellyfish. Other invertebrates, like insects, spiders and crustaceans, have a hard outer casing called an exoskeleton. This protects their body a bit like a suit of armour.



Super Scientist
Carl Linnaeus
In 1735, Swedish Scientist Carl Linnaeus first published a system for classifying all living things. An adapted version of this system is still used today: The Linnaeus System.

There are some obvious differences between plants and animals. Plants are green – they can photosynthesise, whereas animals cannot. Organisms such as coral are often thought to be plants, when in fact they are actually animals, but this can only be seen at the cellular level.

Plants are initially split into two groups - **flowering and non-flowering**.
Flowering plants reproduce with seeds, which are protected by a flower or fruit.
Non-flowering plants include conifers, ferns, and mosses.

Micro-organisms, more commonly known as 'germs', 'bugs' or 'microbes', are **tiny living things too small to be seen with the naked eye**. They are found almost everywhere on Earth.

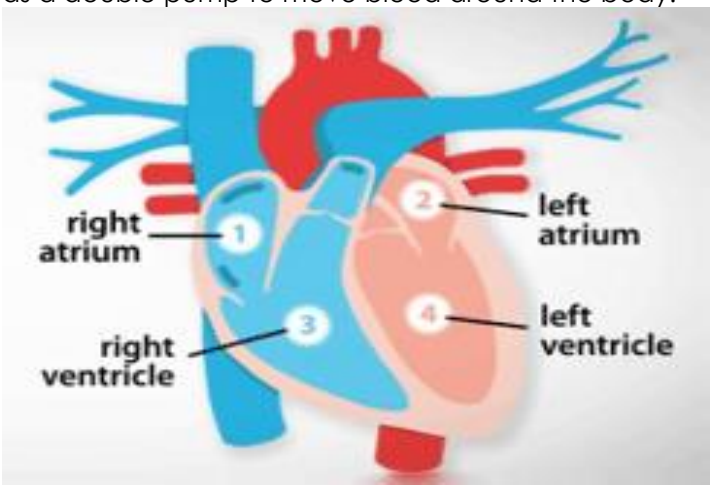
Y6 SCIENCE KNOWLEDGE ORGANISER - AUTUMN 2: STAYING ALIVE AND STAYING HEALTHY - HOW DO WE DO IT?
THRESHOLD CONCEPT: BIOLOGY – UNDERSTANDING ANIMALS AND HUMANS

Key Vocabulary			
arteries	Blood vessels that carries blood away from the heart to other parts of the body.	oxygenated	With oxygen.
bacteria	A type of microscopic organisms.	plasma	The yellow part of the blood.
capillaries	Small blood vessels that enable the moving of water, oxygen, carbon dioxide and nutrients in the blood.	Transportation	The movement of something from one place to another.
deoxygenated	Without oxygen.	veins	Blood vessels that carry blood to the heart from the other parts of the body.
lungs	The two spongy organs inside your chest, which fill with air when you breathe in. They remove carbon dioxide from blood and add oxygen.	oxygen	A colourless gas that exists in large quantities in the air. All plants and animals need oxygen in order to live.

The circulatory system is made up of the heart, the lungs, blood and the vessels it travels through.

Its function is to transport nutrients, gases and wastes between the cells of the body and the digestive system, respiratory system and excretory system. It also carries hormones for internal communication and co-ordination, and white blood cells for fighting disease, as well as assisting in maintaining body temperature.

The heart is a huge muscle that never appears to rest. In fact it does rest – between each heart beat! It beats rhythmically, contracting two sets of chambers to act as a double pump to move blood around the body.

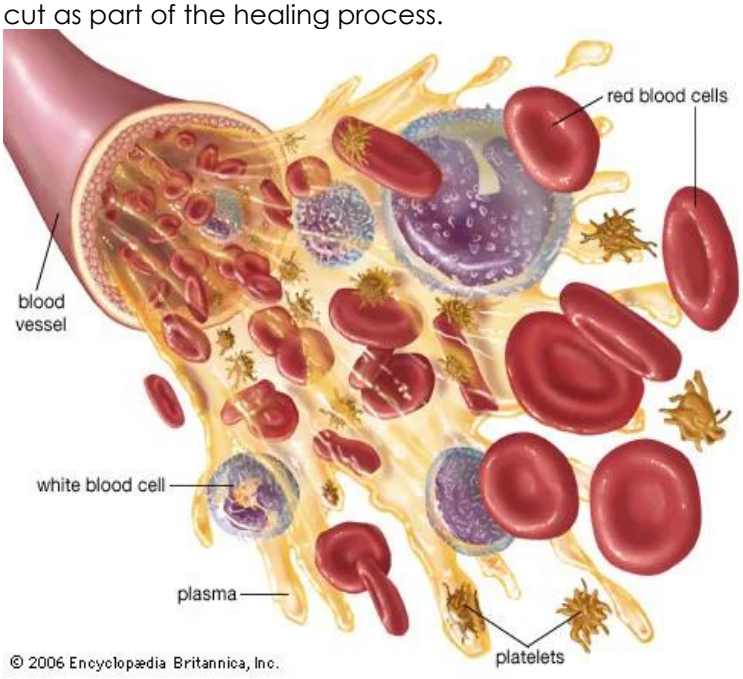


The right side of the heart pumps deoxygenated ('used') blood through the pulmonary circuit to the lungs, where it picks up oxygen and where carbon dioxide is released. The blood is then returned to the left side of the heart, which is sufficiently muscular and powerful to pump the blood through the systemic circuit to all tissues of the body, including the kidneys for waste removal, and the liver for blood sugar regulation.

Diet and Lifestyle
Fatty rich foods can clog arteries and veins, preventing blood from delivering what is needed. Exercise can improve the health of a person by removing fatty deposits from the body.
Some exercises are called cardiovascular, and are designed to improve the fitness of the overall circulatory system by strengthening the organs and pulse rate .

Super Scientist
Alexander Fleming
Fleming discovered the first antibiotic drug – penicillin. He shared the Nobel Prize for Medicine in 1945. Fleming's research helped modern antibiotics, which have proved to be effective drugs for the treatment of many diseases including pneumonia and meningitis.

Blood is made of a watery yellow fluid called plasma that carries dissolved nutrients, hormones and proteins. It contains red blood cells, which carry gases around the body and make the blood appear red. It also carries white blood cells, which fight against disease. The blood also contains platelets, which form the scabs we get on a cut as part of the healing process.



Y6 SCIENCE KNOWLEDGE ORGANISER - SPRING 1: HOW ARE WE EVOLVING?
THRESHOLD CONCEPT: BIOLOGY - - UNDERSTAND EVOLUTION AND INHERITANCE

Key Vocabulary			
offspring	The young animal or plant that is produced by the reproduction of that species.	habitat	Refers to a specific area or place in which particular animals and plants can live.
inheritance	This is when characteristics are passed on to offspring from there parents.	environment	An environment contains many habitats and includes areas where there are both living and non-living things.
variations	The differences between individuals within a species.	evolution	The movement of something from one place to another.
characteristics	The distinguishing features or qualities that are specific to a species.	natural selection	The process where organisms that are better adapted to their environment tend to survive and produce more offspring.
adaptive traits	Genetic features that help a living thing to survive.	Inherited traits	Traits you get from your parents.
adaptations	A trait (or characteristic) changing to increase a living thing's chances f surviving and reproducing.	fossil	The remains or imprint of a prehistoric plant or animal, embedded in rock and preserved.

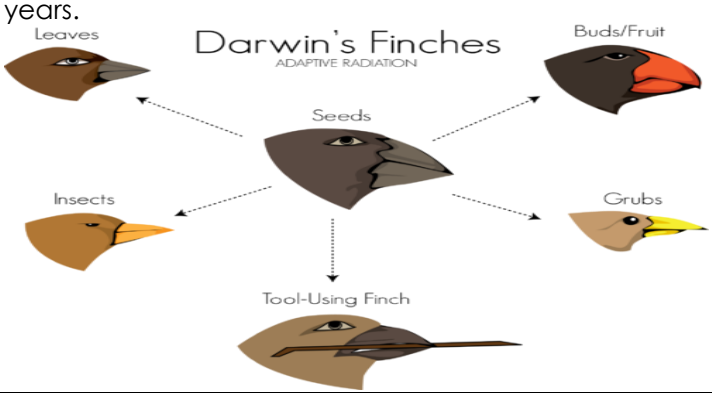
The way we look is controlled by our genes, which are a mixture of those from your parents – half from the mother and half from the father.

Some characteristics are carried by a single pair of genes, others by lots of genes working together. Some characteristics, such as brown eyes, are dominant. If your mother has a blue-eyed gene and your father a brown version, the brown will 'win' and you will have brown eyes.

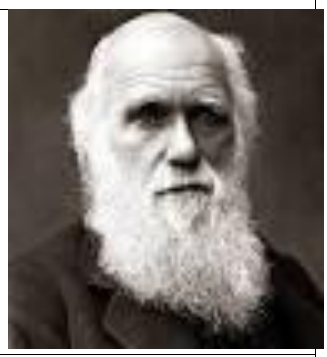
The process of evolution by **natural selection** was proposed by Charles Darwin in 1858. It is important to note that animals do not 'choose' to change. They have an advantage over other animals, so will survive long enough to breed and pass on their characteristics.

By noticing that finches on the different islands had beaks that were adapted to their environment, and realising that finches, whose beaks weren't adapted, wouldn't survive, Darwin was able to start working out his theory of **evolution.**

Evolution is not 'just a theory'. There is an overwhelming amount of supporting evidence and scientists believe it is the best mechanism for explaining how the wide variety of life on Earth came about. The process takes place over very long timescales: for example, the evolution of the polar bear from the brown bear took over 100,000 to 250,000 years.



Super Scientist
Charles Darwin
Darwin's analysis of the plants and animals he gathered led him to question how species form and change over time. This work convinced him of the insight that he is most famous for—natural selection.

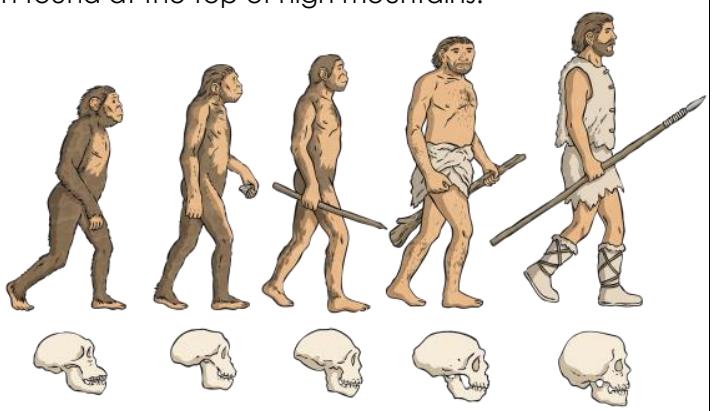


Planet Earth is 4.6 billion years old. The first life began in the seas around 3.6 billion years ago. The earliest life was single-celled creatures like bacteria and algae.

Human beings have only been around for a tiny fraction of the Earth's history.

Fossils tell us a lot about living things that died millions of years ago. The parts that become fossilised can tell us about how they looked, how big they were and even what they ate by looking at their teeth (and sometimes fossilised poo!

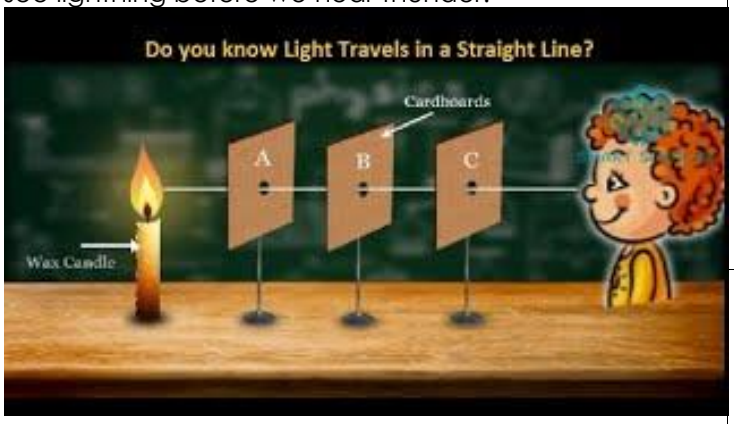
Creatures that died in this sea would have sunk to the bottom and in some cases become buried and eventually become fossils. Millions of years later, the movement of the Earth's plates pushed the sea floor upwards, forming land. Fossil sea shells have sometimes been found at the top of high mountains.



Y6 SCIENCE KNOWLEDGE ORGANISER - SPRING 2: HOW DOES IT WORK AND HOW CAN WE SUSTAIN IT?
THRESHOLD CONCEPT: PHYSICS – TO UNDERSTAND LIGHT AND SEEING

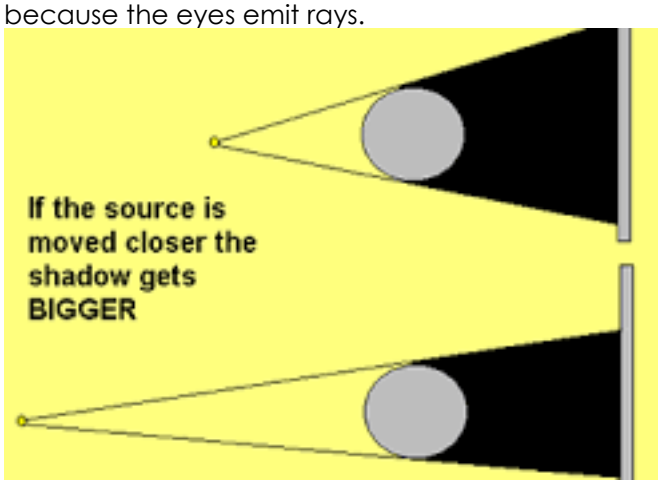
Key Vocabulary			
angle	The direction from which you look at something.	opaque	You cannot see through it.
dark	The absence of light.	reflects	Light or an image sent back from a surface.
dim	Light that is not bright.	shadows	A dark shape on a surface that is created when something stands between light and a surface.
emits	To emit a sound or light means to produce it.	source	Where something comes from or originates from.
light	A brightness that lets you see things.	translucent	A material, which allows some light to pass through it.
mirror	A piece of material that reflects light so that when you look into it, you can see yourself reflected in it.	transparent	You can see through it.

Visible light is a member of a family of waves known as the electromagnetic spectrum.
All waves behave similarly. They all travel in straight lines. Light travels faster than sound, which is why we see lightning before we hear thunder.

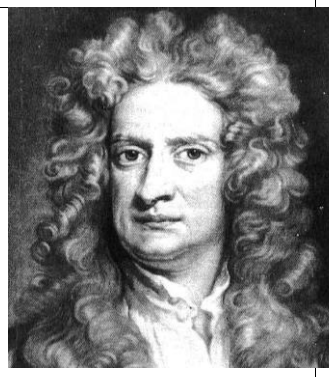


Because light travels in straight lines, the edges of light beams are straight and shadows are the same shape as the object casting them. If the light source is small, the edges of the shadows are sharp. If a large light source is used, the edges of the shadow are blurred.

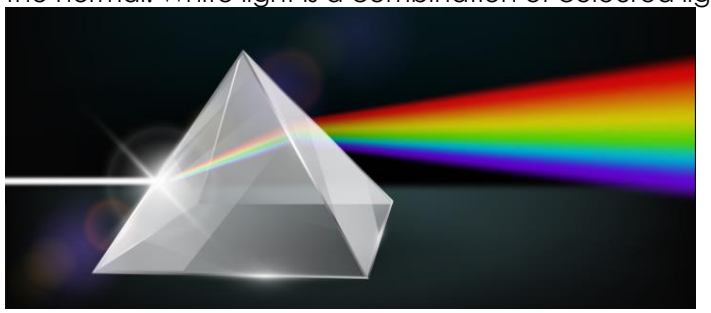
All objects reflect light, but some reflect light more than others; that is why we can see them. Light from a luminous source, such as the Sun or a bulb, reflects from an object into our eyes. Even black objects reflect a small amount of light. Both Plato and Ptolemy developed theories, which stated that we see things because the eyes emit rays.

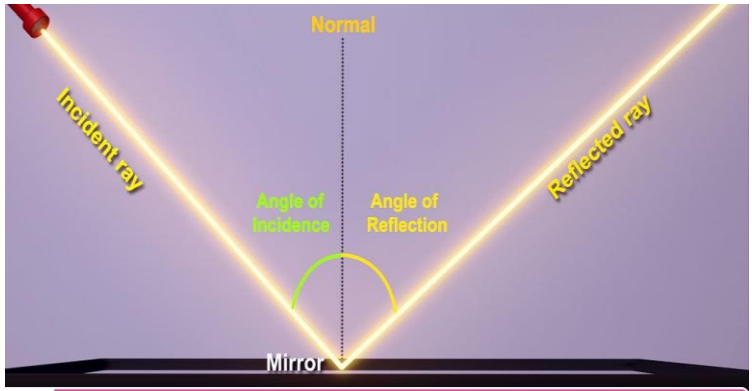


Super Scientist
Sir Isaac Newton
Isaac Newton was one of the great figures in the history of science.
His first great discovery came from his experiments with light. He found that when white light passes through a prism, or triangular piece of glass, it breaks up into a band of colours. Newton concluded that white light is a mixture of colours.



When light passes from one material into another, it changes direction. The change in direction is known as refraction. When it passes from air into a more dense material, such as glass, Perspex or water, it changes direction towards the normal. When it passes from a more dense material into air, it changes direction away from the normal. White light is a combination of coloured light





REFLECTION OF LIGHT

The law of reflection states: The angle of incidence equals the angle of reflection.

Y6 SCIENCE KNOWLEDGE ORGANISER - SUMMER 1: HOW DOES IT WORK AND HOW CAN WE SUSTAIN IT?
THRESHOLD CONCEPT: PHYSICS - UNDERSTAND ELECTRICAL CIRCUITS

Key Vocabulary			
circuit	A closed loop for electricity to travel around	insulator	An object that does not allow electricity to flow through it easily
component	A part used in an electrical circuit	circuit symbols	A complete and closed path around which a circulating electric current can flow.
electricity	A form of energy caused by electrons moving	voltage	A force that makes electricity flow through a wire (it is measured in volts)
cell (battery)	A stored source of electricity	motor	A machine that turns electrical energy into movement
switch	A switch turns an electrical circuit on or off by completing or breaking the circuit	buzzer	An electrical device that makes a buzzing noise and is used for signalling.
conductor	An object that allows electricity to flow through it easily (objects made of metal are good conductors)	current	A flow of electricity which results from the ordered directional movement of electrically charged particles.

A simple electric circuit can consist of a battery (or other energy source), a light bulb (or other device that uses energy), and conducting wires that connect the two terminals of the battery to the two ends of the light bulb.

Electrical circuits:

Current electricity is the flow of electrical charge though materials.

A complete circuit must have a power supply. This power supply could be the mains, or it could be a battery.

For a circuit to be complete, there must be wires connected to both the positive and negative ends of the power supply.

Electricity can only flow around a complete circuit that has no gaps.

Cells and batteries:

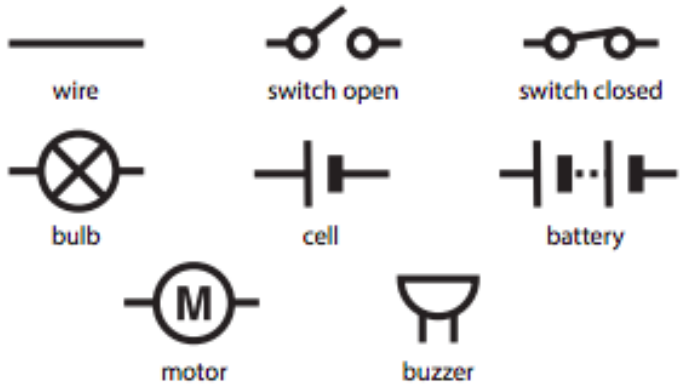
In everyday language, we call a single cell a 'battery' but this is not the correct scientific usage.

Scientifically, this is a cell. It is a single unit, containing two electrodes and an electrolyte.

Electrodes are charged electrical conductors inside a cell. Each cell has one positive and one negative electrode.

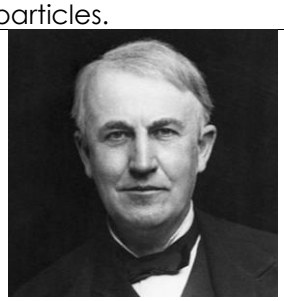
An electrolyte is a chemical that reacts with the electrodes to produce an electrical current.

A battery is the scientific name for a collection of cells joined together.



Super Scientist
Thomas Edison

Born in 1847, he is known as on of the greatest inventors in history. He invented the ightbulb, the phonograph (which could record and play sound) and the early camera called the kinetograph.



Current and Voltage:

Current is the steady flow of electrons and is measured in amperes (amps).Voltage is the force that makes the electric current flow and is measured in volts (V).

The greater the voltage, the more current will flow.