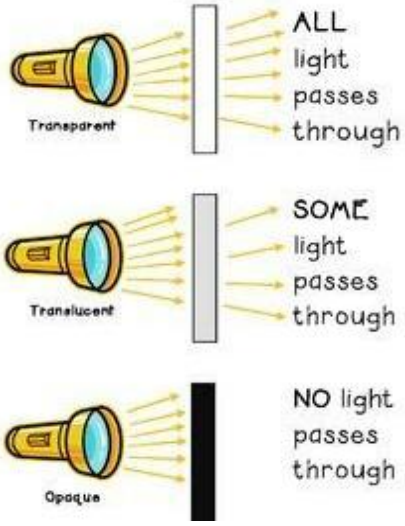
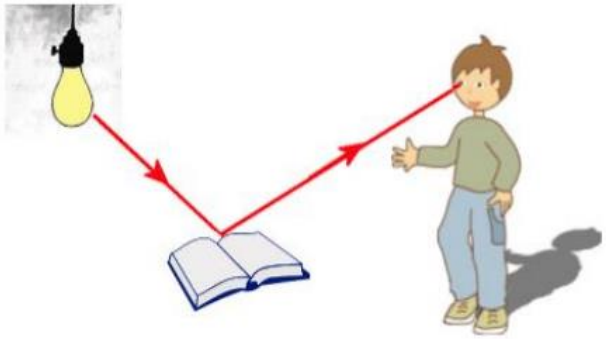
Knowledge Organiser Science: Light and Shadows

Concept: Energy

Key Vocabulary	
light	a form of energy that travels in waves from a source
shadow	a dark shape formed when light from a source is blocked by an opaque object
light source	an object that produces its own light; these can be natural or artificial
natural source	produced from nature, e.g. the Sun,
artificial source	man-made sources of light, e.g. electricity
incident ray	a ray of light that hits a surface.
prism	a solid 3D shape where two faces are the same shape and size (and look like a 2-D shape)
reflected ray	when a ray of light hits a surface and 'bounces' off
refraction	when bends as it passes from one medium to another. E.g. air into water
visible spectrum	Light that is visible to the human eye. It is made up of a colour spectrum.
rainbow	an arch of colour caused by the refraction of light on water droplets in the air, usually rain
dispersed	spread out

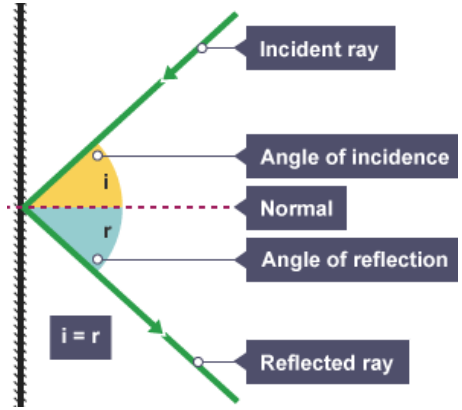
Translucent, transparent and opaque objects





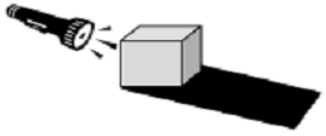
We need **light** in order to see things. Light waves travel from **sources** of light in straight lines. They reflect off objects and into our eyes.

Sources of light: **Natural** vs. **Artificial**



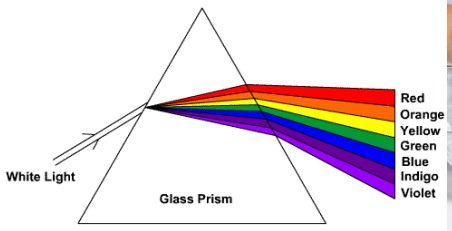
< *The **law of reflection***

This law states that a light's angle of incidence is ALWAYS equal to the angle of reflection when being reflected on a smooth surface.

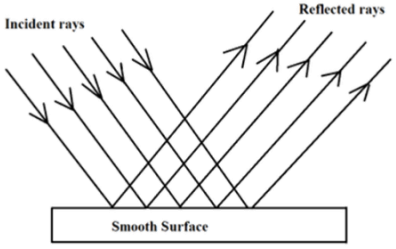


As the **light source** moves higher, the shadow gets shorter. As the light source moves lower, the shadow gets longer.

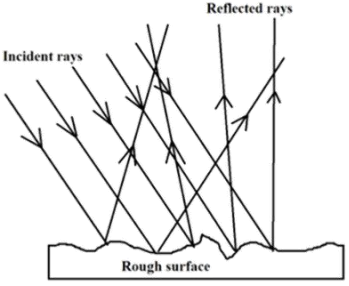
When white light passes through a glass **prism**, it is **refracted**. The light changes direction and is then **dispersed** as it exits the prism.



Refraction of light



Light reflecting off a smooth surface



Light reflecting off a rough surface

Knowledge Organiser Science: Electricity

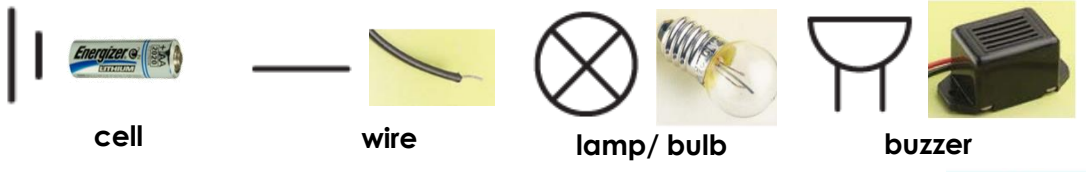
Key Vocabulary	
electricity	a form of energy resulting from the existence of charged particles
energy	how things change and move
conductors	materials which allow electricity to flow through them easily; *for example, metals*
insulators	materials which do not allow electricity to travel through it easily; *for example, plastics*
current	a flow of electricity in a circuit.
amps	measure the number of electrons (current) that can flow through a material ; e.g. a wire in a circuit
voltage	an electrical force that makes electricity flow through a wire, measured in volts.
circuit	a complete and closed path around which a circulating current can flow
component	a part of a circuit; e.g. bulb, buzzer
cell	A portable store of energy.
battery	Two or more cells joined together to store more energy.

Concept: Energy

- Electricity is a form of **energy**.
- Electricity can flow through wires/ cables and be stored in **batteries** (or cells).
- Some materials **conduct** electricity (conductors) and some do not (insulators).

How do we make **electricity?**

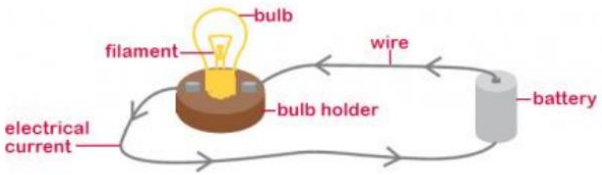
Main components of a **circuit**

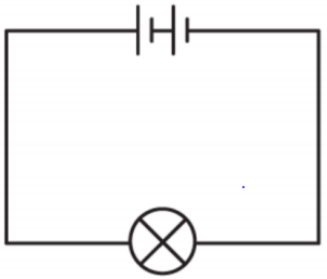


A complete, simple **circuit**

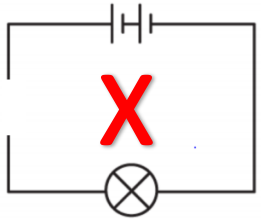
In order for electricity to flow, a circuit needs three things:

1. A source of electricity (cells/ battery)
2. No gaps in the circuit (closed)
3. Conductors (metal wires)

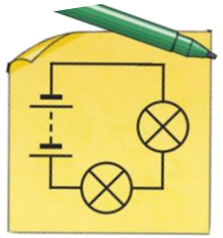




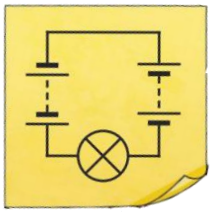
For a circuit to work, it must be 'complete'. If there is a break in the circuit, it is incomplete and the current cannot flow through it.



An **ammeter** can be used to measure the size of the electrical current flowing through a circuit.



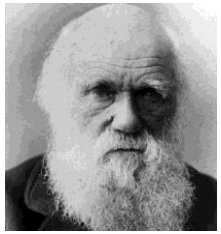
The brightness of a bulb or the volume of a buzzer relies on the number and voltage of cells used in the circuit.



Knowledge Organiser Science: Evolution and Inheritance

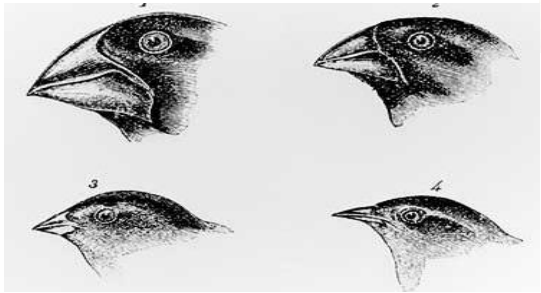
Key Vocabulary	
evolution	adaptation/ change over a very long time
adaptation	the process of change so that an organism or species can become better suited to their environment
descendant/ ancestor	a blood relative or an early type of animals or plant from which others have evolved
natural selection	the competition to survive, 'survival of the fittest'
environment	the surroundings or conditions in which a person, animal, or plant lives
reproduction	the production of offspring by a sexual or asexual process
offspring	a person's child or children/ an animal's young
inherit / inheritance	to gain a quality, characteristic or predisposition genetically from a parent or ancestor
artificial selection/ selective breeding	the process by which humans breed animals or plants to develop specific characteristics.
fossil	the remains or impression of a prehistoric plant or animal embedded in rock and preserved
body fossil	preserved remains of the body of the actual animal or plant itself
trace fossil	Indirect evidence of life in the past such as the footprints, tracks or waste left behind by animals

Concept: Evolution



Charles Darwin (1809 - 1882) first proposed the idea of **evolution** through **natural selection** in his book 'On the Origin of Species'.

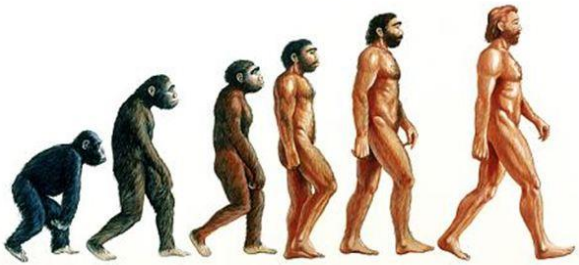
Evidence of evolution



Darwin realised that finches **adapted** their beaks to the different food sources that were available. This is known as **variation**.

Evidence of evolution can also be found in fossils and bones.

The Theory of Evolution

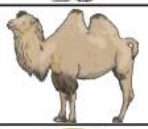


The theory states that all species of life have **descended** over time from common **ancestors**.

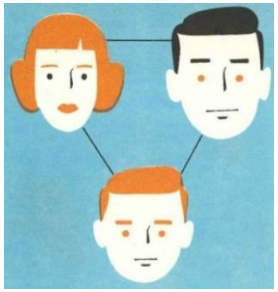
Natural selection

Each species is competing and must **adapt** to secure food to survive and produce **offspring**. Those that adapt best will survive, those that don't will become extinct!

Examples of **adaptation** in nature

Living Things		Habitat		Adaptive Traits
polar bear		arctic		Its white fur enables it to camouflage in the snow.
camel		desert		It has wide feet to make it easier to walk in the sand.
toucan		rainforest		Its narrow tongue allows it to eat small fruit and insects.

Inherited traits



Some of a parent's characteristics are passed down, or 'inherited', to their offspring; e.g. hair or eye colour.

Artificial selection

Plants / animals come from **common ancestors**.

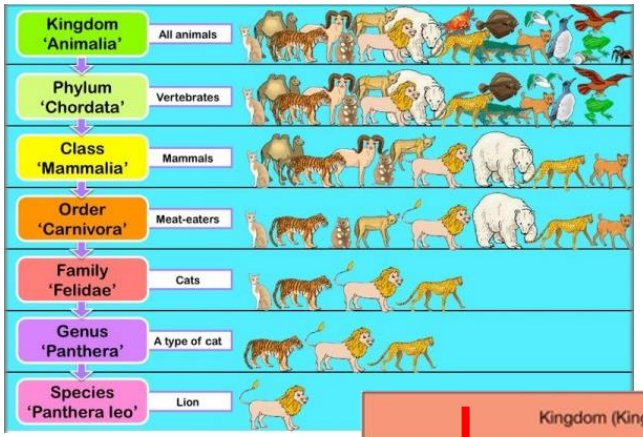
They can be bred to have certain characteristics; e.g. no seeds or long ears.

Knowledge Organiser Science: Living things

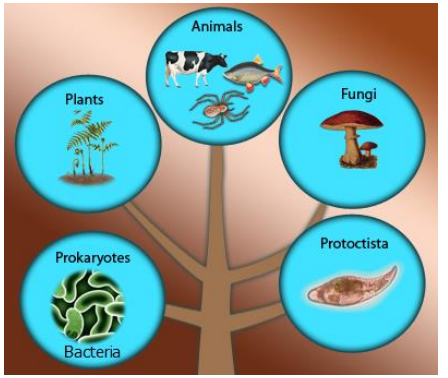
Concept: Evolution

Key Vocabulary	Things we already know
classification	the arrangement of organisms into groups based on their similarities and evolutionary relationships
taxonomy	the science of naming, identifying and classifying organisms
organism	an individual animal, plant or single-celled life form
micro-organism	an organism which is microscopic, making it too small to be seen by the human eye
bacteria	tiny organisms that are everywhere around us.
species	a group of closely related organisms that are very similar to each other and are usually capable of producing offspring
genus	the group an organism belongs to
vertebrate	an animal that has a backbone
invertebrate	an animal that does not have a backbone
mammal	an animal that gives birth to live young
amphibian	an animal with an internal skeleton that lives both in and out of water
reptile	animals that are cold-blooded., lay eggs and their skin is covered with hard, dry scales
insect	an animal with 6 legs

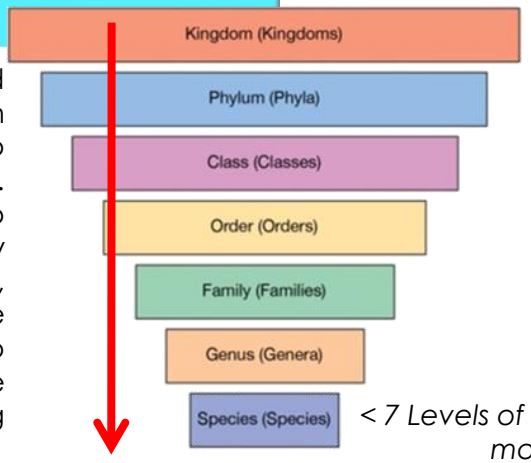
How plants/ animals are classified



The 5 Kingdoms



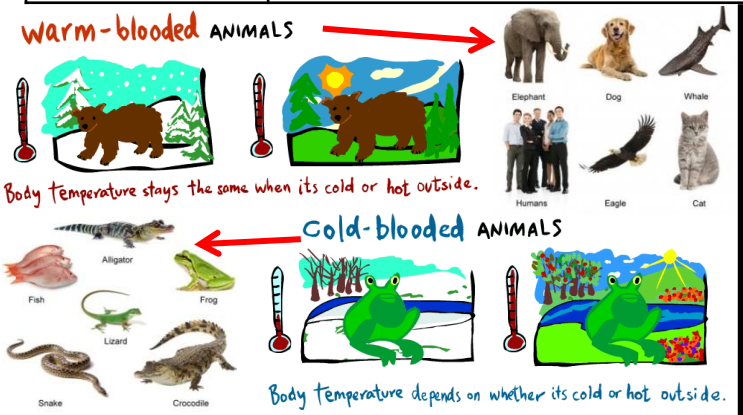
Living things are divided into groups, with members of each group having similar features. Each time we divide up the living things by particular characteristics, the groups become smaller until we end up with the a single organism being identified.

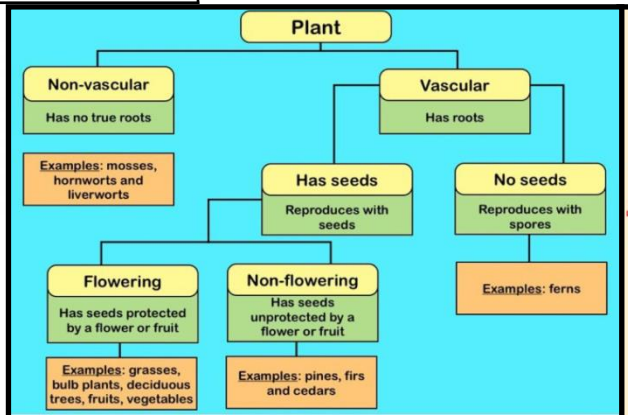


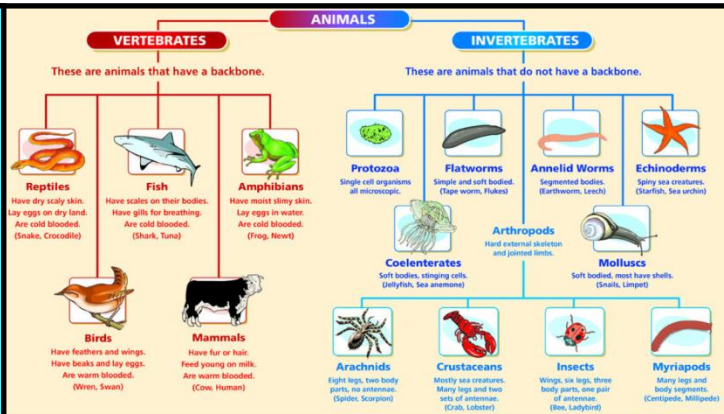
< 7 Levels of Classification model

Carl Linnaeus is famous for his work in **taxonomy**.

Classification of plants and animals



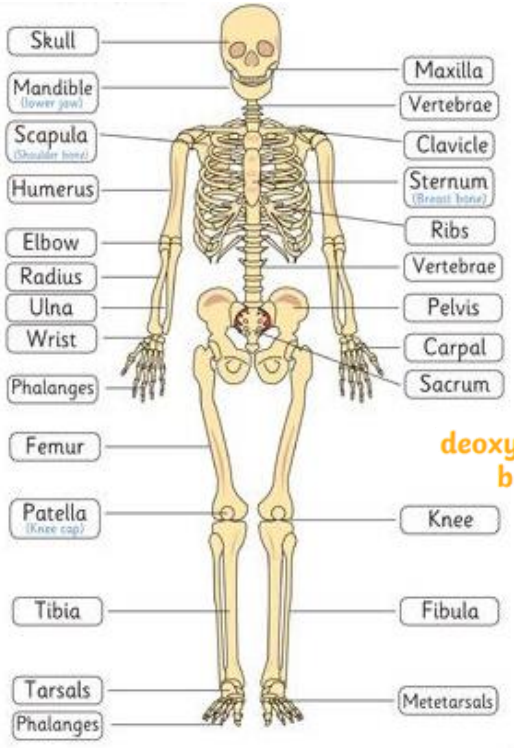




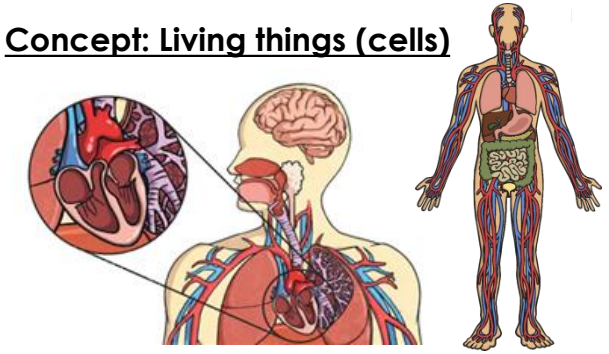
Knowledge Organiser Science: Animals and Humans

Concept: Living things (cells)

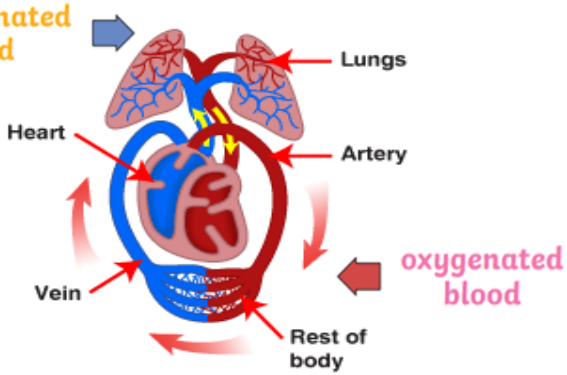
Key Vocabulary	
circulatory system	the system responsible for circulating blood through the body, that supplies nutrients and oxygen to the body and removes waster products such as carbon dioxide
blood vessels	the narrow tubes through which your blood flows - *arteries, veins and capillaries are blood vessels*
capillaries	tiny blood vessels in your body
veins	a tube in your body that carries deoxygenated blood to your heart from the rest of your body
arteries	a tube in your body that carries oxygenated blood from your heart to the rest of your body
oxygenated	blood that contains oxygen. IT is pumped from the heart to the rest of the body.
deoxygenated	blood in which most of the oxygen has been transferred to the rest of the body.
respiration	process of respiring, breathing, inhaling and exhaling air
heart	the organ in your chest that pumps the blood around your body
lungs	two organs inside your chest which fill with air when you breathe in - *they oxygenate the blood and remove carbon dioxide from it*
nutrients	substances that helps plants and animals grow



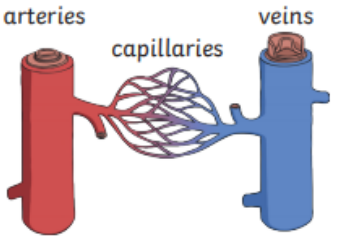
^ *The bones in a human skeleton*



The heart pumps blood to the lungs to get oxygen. It then pumps this **oxygenated** blood around the body. We call this the **circulatory system**.



The blood that comes from the body is deoxygenated and the blood that comes from the lungs is oxygenated.

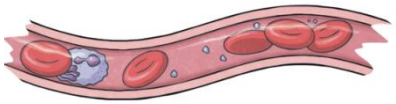


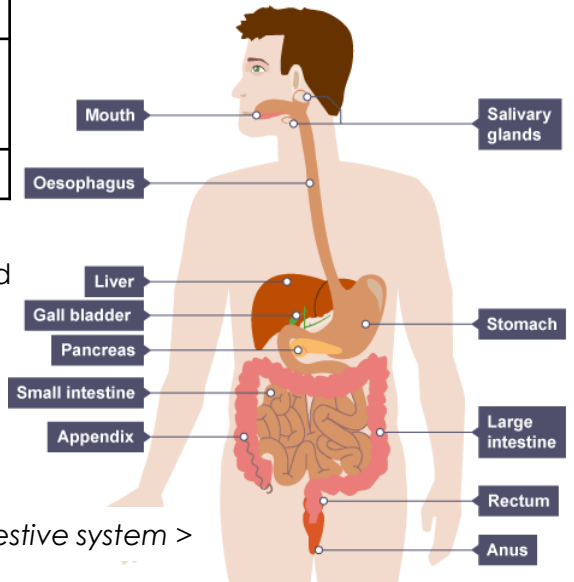
Capillaries are the smallest **blood vessels** in the body and it is here that the exchange of <u>water</u>, <u>nutrients</u>, <u>oxygen</u> and <u>carbon dioxide</u> takes place.

The human body needs a constant supply of blood to keep working.

As we exercise, our muscles need more **oxygen**. We breathe quicker so our lungs can take in more oxygen. Our heart rate increases to pump more blood to the active muscles.

Our blood transports:
- gases (mostly oxygen and carbon dioxide)
- **nutrients** (including water)
- waste products





The human digestive system >