

Previous knowledge.

- To be able to describe the changes as humans develop to old age.

Science Knowledge Organiser – Year 6 Biology: Animals including humans

What I will learn in this unit.

- To be able to identify and name the main parts of the human circulatory system
- To be able to recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- To be able to describe the ways in which nutrients and water are transported within animals, including humans

| | | | |
|--|--|---|--|
| Plasma is liquid. The other parts of your blood are solid. | | Platelets help you stop bleeding when you get hurt. | |
| Red blood cells carry oxygen through your body. | | White blood cells fight infection when you're sick. | |

| Word | Definition |
|--------------------|---|
| heart | The organ which constantly pumps blood around the circulatory system |
| blood vessels | The tube-like structures that carry blood around the body |
| oxygenated blood | Blood has more oxygen. It is pumped from the heart to the rest of the body |
| deoxygenated blood | Blood where most of the oxygen has been transferred to the rest of the body |
| circulatory system | A system which includes the heart, veins, arteries and the blood transportation around the body |

Blood transports:

- gases (mostly oxygen and carbon dioxide);
- nutrients** (including water);
- waste products.

The liquid part of blood contains water and protein. This is called plasma.

Mammals have **hearts** with four chambers. Notice how the blood that has come from the body is **deoxygenated**, and the blood that has come from the lungs is **oxygenated** again. The blood isn't actually red and blue: we just show it like that on a diagram.

from body to body
to lungs from lungs
from body

deoxygenated blood oxygenated blood

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

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

Arteries carry **oxygenated blood** away from the **heart**.

Veins carry **deoxygenated blood** toward the **heart**.

Regular exercise:

- strengthens muscles including the heart muscle;
- improves circulation;
- increases the amount of oxygen around the body;
- releases brain chemicals which help you feel calm and relaxed;
- helps you sleep more easily;
- strengthens bones.

It can even help to stop us from getting ill.



Scientist study: Sir Richard Doll (1912 - England)

Sir William Richard Doll was a British physician who became an epidemiologist in the mid-20th century and made important contributions to that discipline. He was a pioneer in research linking smoking to health problems. He sadly died in 2005.



Drugs, alcohol and smoking have negative effects on the body.

A healthy diet involves eating the right types of **nutrients** in the right amounts.

Science Knowledge Organiser – Year 6 Biology: Living things and their habitats

Previous knowledge.

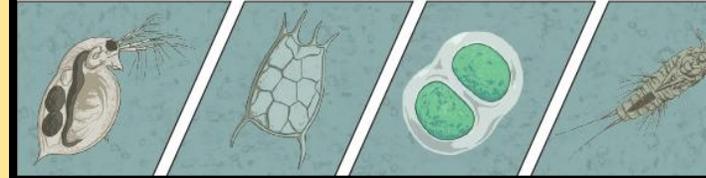
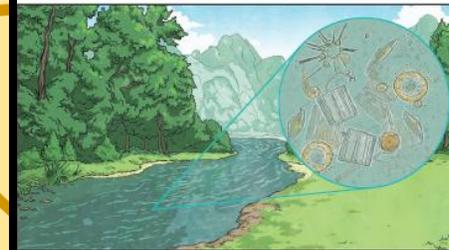
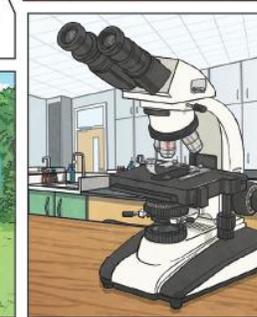
- To be able to describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
- To be able to describe the life process of reproduction in some plants and animals.

| Word | Definition |
|------------------------|---|
| diversity | The variety of life on Earth at all its levels, from genes to ecosystem |
| classify | To sort things into different groups |
| common characteristics | Specific qualities or appearances that make an individual or group of things different to others |
| taxonomist | A scientist who classifies different living things into categories |
| key | A key is a series of questions about the characteristics of living things which is used to identify or classify |

Microorganisms

Microorganisms are viruses, **bacteria**, moulds and yeast. Some animals (dust mites) and plants (phytoplankton) are also **microorganisms**.

Microorganisms are very tiny living things that can only be seen using a **microscope**. They can be found in and on our bodies, in the air, in water and on objects around us.

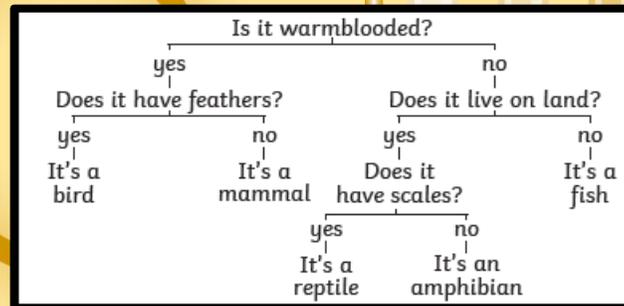
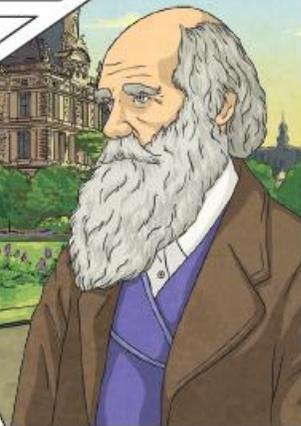


What I will learn in this unit.

- To be able to describe how living things are classified into broad groups according to common observable characteristics
- To be able to give reasons for classifying plants and animals based on specific characteristics

| | |
|--------------------------|---|
| Domain: Eukarya | jackal, clownfish, cat, dog, ladybird, daisy, rabbit, fox |
| Kingdom: Animalia | jackal, clownfish, cat, dog, ladybird, rabbit, fox |
| Phylum: Chordata | jackal, clownfish, cat, dog, rabbit, fox |
| Class: Mammalia | jackal, cat, dog, rabbit, fox |
| Order: Carnivora | jackal, cat, dog, fox |
| Family: Canidae | jackal, dog, fox |
| Genus: Canis | jackal, dog |
| Species: Lupus | dog |

Each group allows scientists to observe and understand the **characteristics** of living things more clearly. They group similar things together then split the groups again and again based on their differences.



Scientist study: Carl Linnaeus (1707 - Sweden)

Carl Linnaeus, also known as Carl von Linné or Carolus Linnaeus, is often called the Father of Taxonomy. His system for naming, ranking, and classifying organisms is still in wide use today.



Science Knowledge Organiser – Year 6

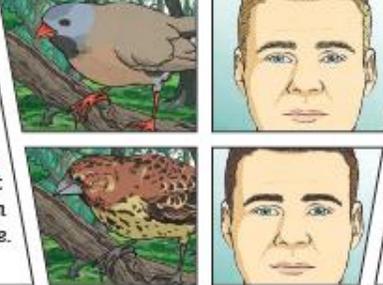
Biology: Evolution and inheritance

Previous knowledge.

- To be able to recognise that living things can be grouped in a variety of ways
- To be able to explore and use classification keys to help group, identify and name a variety of living things
- To be able to recognise that environments can change and that this can sometimes pose dangers to living things.

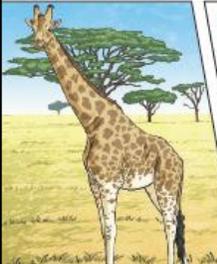
What I will learn in this unit.

- To be able to recognise that living things have changed over time and that fossils provide information
- To be able to recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
- To be able to identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

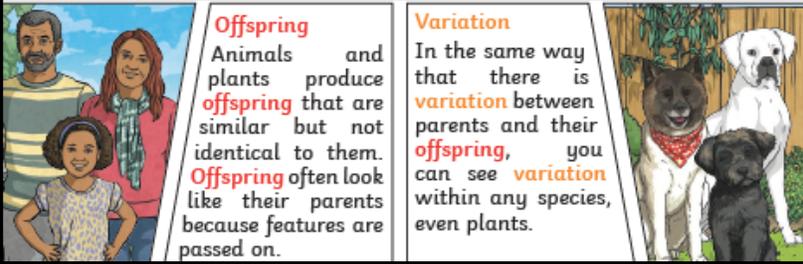
| | |
|---|--|
| <p>Adaptive Traits Characteristics that are influenced by the environment the living things live in. These adaptations can develop as a result of many things, such as food and climate.</p>  | <p>Inherited Traits Eye colour is an example of an inherited trait, but so are things like hair colour, the shape of your earlobes and whether or not you can smell certain flowers.</p>  |
|---|--|

| 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. |
| cactus | desert | It stores water in its stem. |
| toucan | rainforest | Its narrow tongue allows it to eat small fruit and insects. |

| Word | Definition |
|-------------------|---|
| inheritance | Characteristic passed on to offspring for the parents |
| variation | The difference between individuals within a species |
| Characteristics | The distinguishing features of qualities that are specific to a species |
| Adaptation | An adaptation is a trait changing to increase survival |
| Habitat | A specific area where a particular animals and plants can live |
| evolution | Adaptation over a very long time |
| Natural selection | The process in which organisms that are better adapted to their environment survive |
| Adaptive traits | Genetic features that help a living thing survive |
| Inherent traits | Traits you get from you parents. For example, curly hair |



Natural Selection
Fossils of giraffes from millions of years ago show that they used to have shorter necks. They have gradually **evolved** through **natural selection** to have longer necks so that they can reach the top leaves on taller trees.



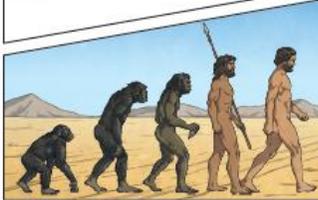
Offspring
Animals and plants produce **offspring** that are similar but not identical to them. **Offspring** often look like their parents because features are passed on.

Variation
In the same way that there is **variation** between parents and their **offspring**, you can see **variation** within any species, even plants.

Fossils are the preserved remains, or partial remains, of ancient animals and plants. Fossils let scientists know how plants and animals used to look millions of years ago. This is proof that living things have evolved over time.

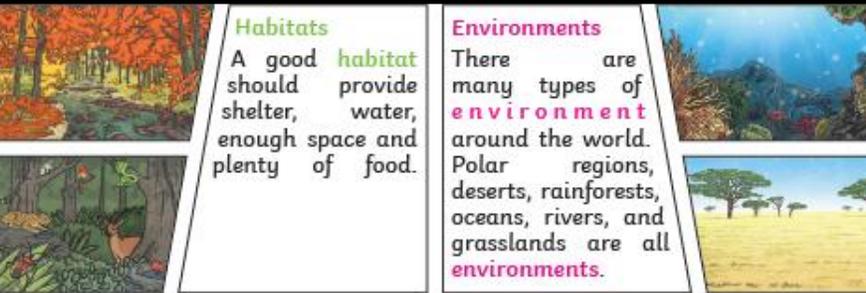


Evolution is the gradual process by which different kinds of living organism have developed from earlier forms over millions of years. Scientists have proof that living things are continuously **evolving** - even today!



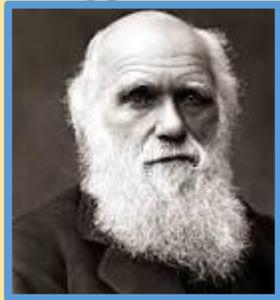
Habitats
A good **habitat** should provide shelter, water, enough space and plenty of food.

Environments
There are many types of **environment** around the world. Polar regions, deserts, rainforests, oceans, rivers, and grasslands are all **environments**.



Scientist study: Charles Darwin (1809 - England)

The theory of natural selection was explored by naturalist Charles Darwin. Natural selection explains how genetic traits of a species may change over time. This may lead to speciation, the formation of a distinct new species.



Science Knowledge Organiser – Year 6

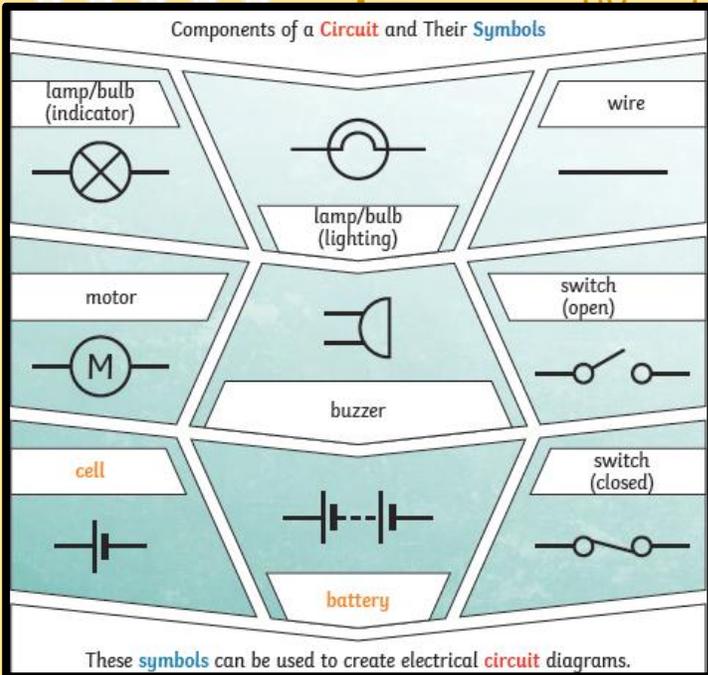
Physics: Electricity

Previous knowledge.

- To be able to identify common appliances that run on electricity
- To be able to construct a simple series electrical circuit, identifying and naming its basic parts
- To be able to identify whether or not a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery
- To be able to recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- To be able to recognise some common conductors and insulators, and associated metals with being good conductors

What I will learn in this unit..

- To be able to associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
- To be able to compare and give reasons for variations in how components function
- To be able to use recognised symbols when representing a simple circuit in a diagram



What will make a bulb brighter or a buzzer louder?

- More **batteries** or a higher **voltage** create more power to flow through the **circuit**.
- Shortening the wires means the **electrons** have less **resistance** to flow through.

Series Circuit
A **circuit** that has only one route for the **current** to take. If more bulbs or buzzers are added, the power has to be shared and so they will be dimmer or quieter. If just one part of this series **circuit** breaks, the **circuit** is broken and the flow of **current** stops.

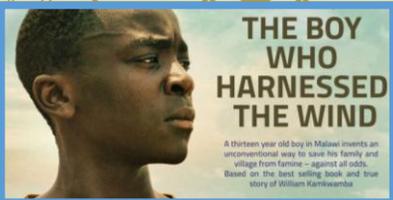
What will make a bulb dimmer or a buzzer quieter?

- Fewer **batteries** or a lower **voltage** give less power to the **circuit**.
- More buzzers or bulbs mean the power is shared by more components.
- Lengthening the wires means the **electrons** have to travel through more **resistance**.

A broken circuit with no electrical current.

| Word | Definition |
|--------------|---|
| circuit | A path that an electrical current can flow around |
| symbol | A visual picture that stands for something else |
| cell/battery | A device that stores chemical energy until it is needed |
| current | The flow of electrons, measured in amps |
| amps | How electricity is measured |
| voltage | The force that makes the electric current move through the wires. The greater the voltage, the more the current will flow |
| resistance | The difficulty that the electric current has when flowing around a circuit |
| electrons | Very small particles that travel around an electrical circuit |

Scientist study: William Kamkwamba (1987 – Malawi)
William Kamkwamba is a [Malawian](#) inventor, engineer, and author. He gained renown in his country in 2001 when he built a [wind turbine](#) to power multiple electrical appliances in his family's house in Wimbe, 23 km (14 mi) east of [Kasungu](#), using [blue gum trees](#), bicycle parts, and materials collected in a local scrapyard.



Science Knowledge Organiser – Year 6

Physics: Light

Previous knowledge.

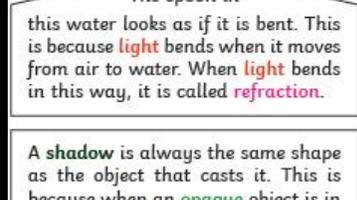
- I can recognise that they need light in order to see things and that dark is the absence of light
- I can notice that light is reflected from surfaces
- I can recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- I can recognise that shadows are formed when the light from a light source is blocked by a solid object
- I can find patterns in the way that the size of shadows change.

| Word | Definition |
|-----------------------|---|
| light source | An object that makes its own light |
| reflection | Reflection is when light bounces off a surface, changing the direction of a ray of light |
| incident ray | A ray of light that hits a surface |
| reflected ray | A ray of light that has bounced back after hitting a surface |
| the law of reflection | The law states that the angle of the incident ray is equal to the angle of the refracted ray |
| refraction | This is where light bends as it passes from one medium to another. For example, light bends when it moves from air into water |
| visible spectrum | Light that is visible to the human eye. It is made up of a colour spectrum |
| prism | A prism is a 3D solid shape with flat sides |
| shadow | An area of darkness where light has been blocked |

Key Knowledge



The spoon in this water looks as if it is bent. This is because **light** bends when it moves from air to water. When **light** bends in this way, it is called **refraction**.

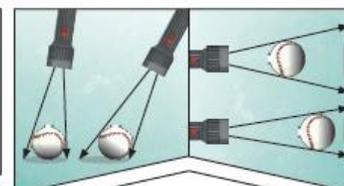
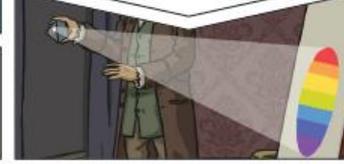


A **shadow** is always the same shape as the object that casts it. This is because when an **opaque** object is in the path of **light** travelling from a **light source**, it will block the **light** rays that hit it, while the rest of the **light** can continue travelling.



Shadows can also be elongated or shortened depending on the angle of the **light source**. A **shadow** is also larger when the object is closer to the **light source**. This is because it blocks more of the **light**.

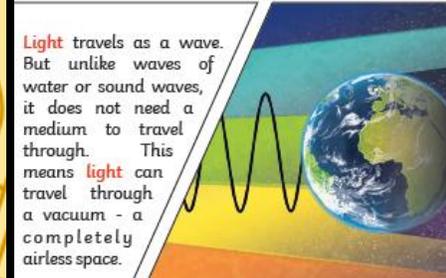
Isaac Newton shone a **light** through a transparent **prism**, separating out **light** into the colours of the rainbow (red, orange, yellow, green, blue, indigo and violet) - the colours of the **spectrum**. All the colours together merge and make visible **light**.



What I will learn in this unit..

- To be able to recognise that light appears to travel in straight lines
- To be able to use the idea that light travels in straight lines to explain how objects are seen
- To be able to explain how we see things because they give out or reflect light into the eye
- To be able to use the idea that light travels in straight lines to explain why shadows have the same shape as the object that cast them

Light travels as a wave. But unlike waves of water or sound waves, it does not need a medium to travel through. This means **light** can travel through a vacuum - a completely airless space.



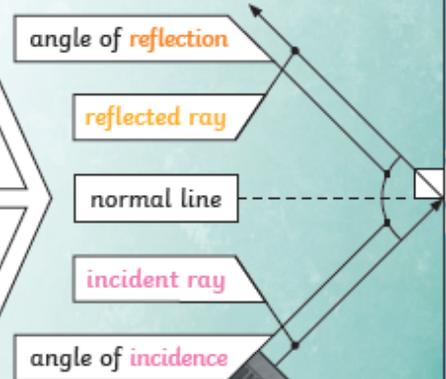
We need **light** to be able to see things. **Light** waves travel out from sources of **light** in straight lines. These lines are often called rays or beams of **light**.

Light from the sun travels in a straight line and hits the chair. The **light** ray is then **reflected** off the chair and travels in a straight line to the girl's eye, enabling her to see the chair.



The law of reflection states that the angle of **incidence** is equal to the angle of **reflection**. Whenever **light** is **reflected** from a surface, it obeys this law.

The angle of **reflection** is the angle between the normal line and the **reflected ray light**.



The angle of **incidence** is the angle between the normal line and the **incident ray of light**.

Scientist study: Percy Shaw (1890 - England)

Percy Shaw, OBE was an English inventor and businessman. He patented the reflective road stud or "cat's eye" in 1934, and set up a company to manufacture his invention in 1935

