

# Year 6 Unit Overview

Light

Living Things and their Habitats

Electricity

Animals, Including Humans - The Heart and Health

Evolution and Inheritance

## Scientists



[CV Raman](#)  
(Physicist)  
[Professor Colin Webb](#)  
(Professor of Laser Physics)



[Carl Linneus](#)  
(Naturalist and botanist)  
[Nazifa Tabassum](#)  
(Microbiologist and Science Communicator)



[Mo Ibrahim](#)  
(Pioneer in the mobile phone industry)  
[Hertha Ayrton](#)  
(Engineer, physicist, mathematician and inventor)



[Elizabeth Anionwu](#)  
(Sickle cell and thalassemia specialist)  
[Barouh Berkovits](#)  
(invented the pacemaker and defibrillator)  
[William Harvey](#)  
(Discovered how



[Rosalind Franklin](#)  
(Discovered the structure of DNA)  
[Charles Darwin](#)  
(Naturalist, developed the theory of evolution)

## Careers

Architect (designs buildings)  
Ophthalmologist (a doctor specialising in vision and eye health)

Microbiologist (studies tiny living things)  
Plant geneticist (studies genetics in plants - many work on developing crops to be more robust or provide more nutrition)

Electrician (installs and maintains electrical equipment)  
Renewable energy engineer (works on environmentally conscious energy production)

Cardiologist (a doctor specialising in the heart and circulatory system)  
Haematologist (studies blood and its diseases)

Archaeologist (studies history using artefacts)  
Geneticist (studies genes)  
Palaeontologist (studies fossils)

## Working Scientifically

I'm recognising and controlling variables like an ophthalmologist.  
I'm taking measurements like an architect.

I'm using test results to make predictions like a microbiologist.  
I'm reporting causal relationships like a plant geneticist.

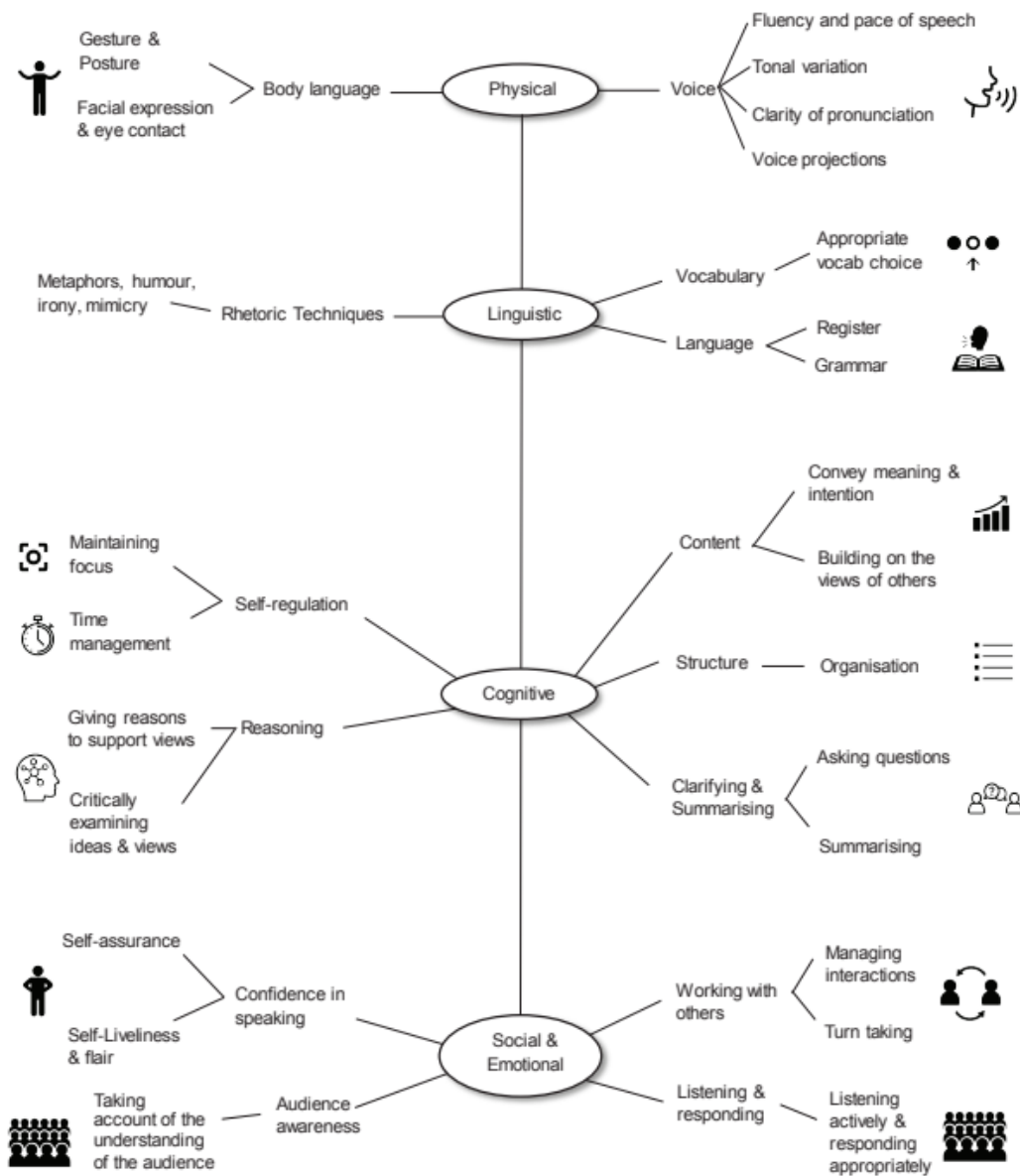
I'm planning different types of scientific enquiries like a renewable energy engineer.  
I'm setting up comparative and fair tests like an electrician.

I'm recording data like a cardiologist.  
I'm using scientific diagrams and labels like a haematologist.

I'm identifying scientific evidence to support ideas like a palaeontologist.  
I'm presenting findings and conclusions like an archaeologist.

# Supporting Oracy Resources

## Oracy Graphic Organiser



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## Sentence Stems for giving feedback

Praise: What have they done well?

Be Specific

Give an example

Why was it good?

- Because you have...
- Your work has had the effect of...
- You have improved how...
- I notice that you...
- This means that...

- When you... it made me...
- Your use of... in order to...
- I enjoyed the part where...
- The part where you... has had the effect of...

Enhance: What do they need to do to improve?

Be specific

Give an example

Why will it enhance their learning?

Checking for Understanding	Reshaping and Extending Learning
<ul style="list-style-type: none"> <li>• Why did you choose to...?</li> <li>• Can you explain how...?</li> <li>• Prove to me how you came to this conclusion by using...</li> <li>• What effect did ... have on ...</li> </ul>	<ul style="list-style-type: none"> <li>• I've noticed that you haven't...</li> <li>• Can you prove...?</li> <li>• Could you have included...?</li> <li>• Where else could you use... in your learning?</li> <li>• In order to improve your learning, you need to...</li> </ul>

Respond: Show that you understand

Read what you could have done better

Correct the mistake

Show how you now understand

- Thank you, I agree that...because...
- I can see why you've said that...
- I actually disagree with you because...
- I have now... the effect this has had is...

- Now that I've had time to reflect...
- I agree with your comment that... because...
- Now that you've pointed it out...
- You've helped me to understand...

# Supporting Oracy Resources

## Tiered Vocabulary Wall- A way to organise our words.

Tiered Vocabulary Walls are a way of organising words. The aim of using Tiered Vocabulary Walls is to increase the amount of Tier 2 and Tier 3 words which children hear and use themselves. Tier 2 and Tier 3 words make the most impact on our vocabulary and on our learning. These words need direct teaching in order for them to be understood and used.

<b>Tier 3</b>	<p><u>Subject specific words:</u></p> <p>These will be rare and will be heard within particular contexts or subject areas. These will need direct teaching, such as:</p> <p><i>estuary, alliteration, igneous...</i></p>
<b>Tier 2</b>	<p><u>Focus words:</u></p> <p>These will be common words that are found across subjects. These will need direct teaching, such as:</p> <p><i>contradict, circumstance, precede, retrospect...</i></p>
<b>Tier 1</b>	<p><u>Everyday words:</u></p> <p>These will be basic, everyday words which will be used from an early age. These will be used freely in speech, such as:</p> <p><i>warm, dog, tired, run, table, flower....</i></p>

For example, Tiered Vocabulary for weather could look like:

**Tier 3:** barometer, isobar, celsius, tsunami

**Tier 2:** predict, forecast, breeze, shower, pressure

**Tier 1:** sun, cloud, rain, cold, warm, wind



### Talking like a Scientist Sentence Stems



- It is...because...
  - It will...because...
  - *How do you know (e.g. 'The porridge is hot')?*
- I think this...because...
  - I know this, so I think...
  - This will happen because...
  - *What do you think?*
  - *What will happen if...?*
- I know that... Therefore, I know that...
  - Due to the fact that..., I know that...will happen.
  - Maybe it's because...
  - It is true that...
  - Having analysed..., I believe that...
  - I can prove how I know this because...
- Can we prove that...?
  - In conclusion, I have found that...
  - I would like to prove / disprove...
  - Perhaps the reason is ...
  - Based on the evidence I have been presented with, I conclude...
  - Taking everything into account...
  - Having pondered...
  - Given this, it is likely that...
  - *If we accept this hypothesis, what else will be true?*

## Oracy in action video library:

- \*[Talk Tactics](#)
- \*[Discussion in EYFS](#)
- \*[Concept Cartoon](#)
- \*[Whole class talk detectives](#)
- \*[Talk Tokens](#)
- \*[New Vocabulary](#)
- \*[Silent Summariser](#)
- \*[Harkness Discussion](#)
- \*[Odd One Out](#)

Light

Unit	Year 6: Light	
National Curriculum	Pupils should be taught to: <ul style="list-style-type: none"> <li>• Recognise that light appears to travel in straight lines.</li> <li>• Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.</li> <li>• Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.</li> <li>• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</li> </ul>	
Prior Learning		Future Learning
<p>Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light)</p> <p>Notice that light is reflected from surfaces. (Y3 - Light)</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light)</p> <p>Find patterns in the way that the size of shadows change. (Y3 - Light)</p> <p>Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials)</p>		<p>The similarities and differences between light waves and waves in matter. (KS3)</p> <p>Light waves travelling through a vacuum; speed of light. (KS3)</p> <p>The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. (KS3)</p> <p>Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. (KS3)</p> <p>Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. (KS3)</p> <p>Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. (KS3)</p>
Key Learning		Key Vocabulary
<p>Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen.</p> <p>Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.</p>		<p>As for Year 3 - Light, plus straight lines, light rays</p>
Common Misconceptions	<p>Some children may think:</p> <ul style="list-style-type: none"> <li>• we see objects because light travels from our eyes to the object.</li> </ul>	



# Year 6 Light

Lesson Question	Skills	Knowledge	Lesson Overview	Summative Assessment Questions	Key Vocabulary
Can I compare materials of different transparencies?	Identifying evidence that has been used to support or refute ideas or arguments	Recognise that light appears to travel in straight lines	Design and build your own lamp.	What is the difference between natural and artificial light sources? Give some examples of materials which are effective at reflecting a light source? Give some examples of materials which are transparent? Give some examples of materials which are translucent? Give some examples of materials which are opaque?	luminous, non-luminous, light source, transparent, opaque
Can I explain how light travels in a straight line and shadows are formed?	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them	Investigate how distance from a light source affects the size of a shadow.	Can the children predict what happens to a light beam when it is obstructed by an opaque object? Can the children measure shadows accurately? <b>Choral Response Questions/ Phrase Suggestions</b> Shadows are formed when... The shadow can change size when... A shadow's angle, when cast by the sun, can change when...	shadow, opposite, obstruct, light ray, fluorescent
How can lenses be used?	Noticing patterns	Recognise that light appears to travel in straight lines; use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye; explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes	Build a refracting telescope.	What are lenses used for? Do magnifying lenses make light spread out or point in? <b>Choral Response Questions/ Phrase Suggestions</b> <i>Light entering a lens bends towards...</i> ... the focal point	focal point, lens, refraction, refracting telescope, convex lens
Can I describe the splitting of white light?	Predict the effects of colour mixing	Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes	Build a Newton's Colour Wheel. Write a statement which explains why the colours seem to disappear.	What is the colour of a green object under white light? Which colours of light are absorbed by a white object? <b>Choral Response Questions/ Phrase Suggestions</b> <i>White light</i> is made up of the following colours: <b>red, orange, yellow, green, blue, indigo, and violet.</b> <i>White light</i> is made up of the following colours...	spectrum, indigo, glass prism, mist, white light
Can I explain how water behaves as a lens?	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye; explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes; use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them	Observe how a glass of water can be used as a lens.	Explain how water behaves like a lens? Why does the water magnify images? <b>Choral Response Questions/ Phrase Suggestions</b> What does a lens do? A lens... Lenses are used to...	medium, magnify, rainbow, apparent, distorted
How does light colour mixing work?	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	Exploring the way that light behaves, including light sources, reflection and shadows.	Investigating coloured objects under coloured lights.	Can children explain how light behaves when different colours are mixed? Why did the papers look white, red, blue, and green (respectively) in white light? How did the filters affect the white torch beam? Why did the yellow and green papers seem to lose their colour when red light was shined on them?	primary colours, secondary colour, light filter, magenta, cyan

## Knowledge Organiser Unit: Light

1

• Can I compare materials of different transparencies?

2

Can I explain how light travels in a straight line?

3

How can lens be used?

4

• Can I describe the splitting of white light?

5

• Can I explain how water behaves as a lens?

6

• How does light colour mixing work?

This unit will help you understand how light travels, as well as exploring how the path and colour of light can change. A key focus is lenses, and how lenses in our eye, in cameras and in microscopes can change the way we view an object. It is important to think about how lenses are used in scientific research and industry, which is why many of the activities in this unit will help you build your own lenses or observe objects through a lens. We take light for granted, but it is amazing how it travels, moves, reflects and changes.

**FACTOIDS:**  
Can you find out more?



**Q1. How does a lens work?**  
They bend rays of light as they pass through so they can change path or direction.

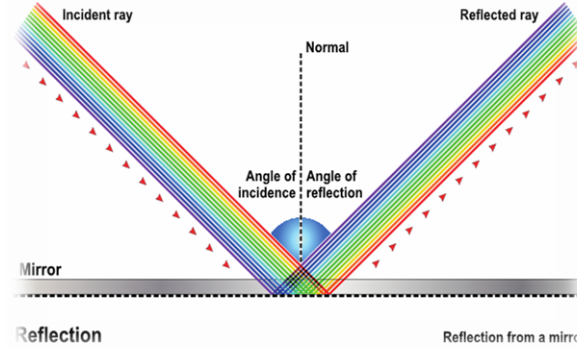
**Q2. What colours is light made up from?**  
Light is made up of all the colours of the spectrum / rainbow. The colour of the light you see depends on its wavelength.

**Q3. How does a telescope work?**  
They have two lenses (one large and one small) which reflect light rather than bending it.

Light sources can be both natural and man-made.

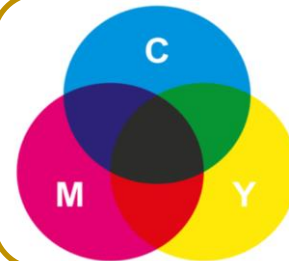
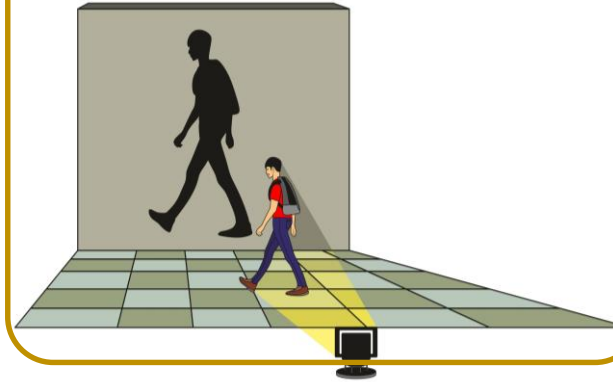
A lens is a piece of transparent glass or plastic that bends light.

### Angles of Incidence and Reflection



### How a shadow forms

Shadow is a dark area formed when an object blocks light from the light source



Light filters can be used to mix or change the colour of the light.

## Key Vocabulary

Key Word	Meaning
transparent	An object or material that allows light to pass through easily.
opaque	An object or material which doesn't allow light through.
translucent	An object or material which allows some light to pass and scatters light rays.
magnify	To make an image larger.
angle of incidence	The angle made by a light ray as it strikes a mirror.
angle of reflection	The angle made by a light ray as it reflects off a mirror.
lens	A transparent material which changes the direction of movement of light.
refraction	The action of distorting an image by viewing through a medium.

Light only travels in straight lines.



# Living Things and their Habitats

Unit	Year 6: Living Things and heir Habitats	
National Curriculum	Pupils should be taught to: <ul style="list-style-type: none"> <li>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.</li> <li>Give reasons for classifying plants and animals based on specific characteristics.</li> </ul>	
Prior Learning		Future Learning
Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats) Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)		Differences between species. (KS3)
Key Learning		Key Vocabulary
Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other livings things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot. Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms. Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.		vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, warm-blooded, cold-blooded, insects, spiders, snails, worms, flowering, non-flowering, mosses, ferns, conifers
Common Misconceptions	Some children may think: <ul style="list-style-type: none"> <li>all micro-organisms are harmful</li> <li>mushrooms are plants.</li> </ul>	

# Knowledge Organiser

## Unit: Living Things and their Habitats

1

• Can I understand the different ways living things are classified?

2

Can I understand how the different kingdoms of life are identified?

3

Can I describe the work of Carl Linnaeus?

4

• Can I understand the differences between different types of vertebrates?

5

• Can I describe examples of things that live in soil?

6

• Can I label the different parts of fungi?

Carl Linnaeus' book called 'Systema Naturae' laid out the classification of living things.

Fungi are their own kingdom as they gain energy from dead plants and animals, not the sun.

### FACTOIDS:

Can you find out more?

Q1. What is soil a habitat to?

Soil mainly contains micro-organisms, of which there are billions.

Q2. What is an ecosystem?

A community of interactive living things which rely on each other to live and grow.

Q3. What does Homo Sapiens mean?

Home is the Latin word for man and sapiens means wise.

This unit is designed to help you understand the way living things are classified and how they interact with each other for survival. You can learn about how to think about different living things by the mnemonic **MRS GREEN**. This unit can also help you think about the importance of habitats and how we should help conserve them.

Many jobs require an understanding of classification, anatomy and habitat, such as vets, doctors, environmentalists and scientific researchers. In any case, we rely on the animal and plant kingdoms to survive, so it's best we know how to conserve them!

### MRS GREEN : Processes

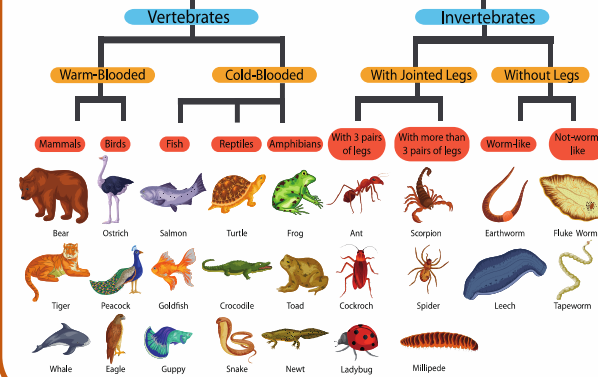


Movement  
Respiration  
Sensitivity

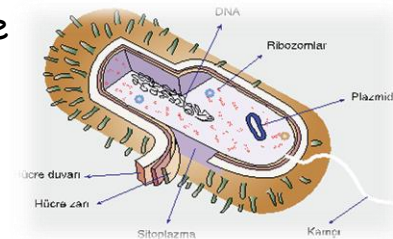
Growth  
Reproduction  
Excretion  
Nutrition



### Classification



### Prokaryote Cell



The six living kingdoms are: animals, plants, fungi, bacteria, protists and archaea.

## Key Vocabulary

Key Word	Meaning
classify	To organise by class, which is a group that has something in common.
prokaryote	A cellular organism which has no nuclear membrane.
species	The smallest class of organisms.
vertebrate	An animal with vertebrae - having a backbone or spinal column.
invertebrate	An animal without a backbone or spinal column.
microorganism	A tiny, microscopic organism such as bacteria, virus or fungus.
fungi	A diverse kingdom which includes mushrooms to brewer's yeasts.
kingdom	A category grouping together all forms of life, having certain characteristics in common.

# Year 6 Living Things and Their Habitats

Lesson Question	Skills	Knowledge	Lesson Overview	Summative Assessment Questions	Key Vocabulary
Can I understand the different ways living things are classified?	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs.	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.	Create your own classification key and challenge your friends!	What different ways are there to classify living things? Why is it important to be able to group and classify living things? What are the different ways that animals can be differentiated to each other?	classify, spore, micro-organism, seed, similarities
Can I understand how the different kingdoms of life are identified?	Planning different types of enquiries to answer questions including recognising and controlling variables where necessary	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals. Give reasons for classifying plants and animals based on specific characteristics.	Have a go at growing your own fungi!		multicellular, unicellular, Kingdom, cell, MRS GREN
Can I describe the work of Carl Linnaeus?	Identifying scientific evidence that has been used to support or refute ideas or arguments	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals, find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.	Research the different kingdoms of life	How does classification help scientists? Why are there different kingdoms? Why is the work of Carl Linnaeus important? Name the types of living organisms which can be found in each kingdom.	Latin, genus, Carl Linnaeus, class, species
Can I understand the differences between different types of vertebrates?	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 or other presentations, identifying scientific evidence that has been used to support or refute ideas	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals, classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals).	Create a hanging mobile display that gives key information about the five different classes of vertebrates.	Why has the classification of living things changed over time? Why is the system designed to classify animals so helpful? Do the children think the classification of living things will change in the future and why?	vertebrate, cold-blooded, amphibian, reptile, mammal
Can I describe examples of things that live in soil?	Grouping and classifying.	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals. Use the local environment throughout the year to explore and answer questions about animals in their habitat.	Research different organisms which live in soil.	What type of soil do you have in your garden or school grounds?	carbon dioxide, microorganism, plant, oxygen, microscopic
Can I label the different parts of fungi?	Record scientific data using diagrams	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals	Observe how spore prints change appearance on paper depending on their distance from it.		mycelium, fungi, mushrooms, yeasts, hyphae

# Electricity

Unit Summary: Building upon Year 4 National Curriculum studies on electricity and circuits, this unit allows a greater depth of understanding of electricity as a whole. There is an opportunity to recall and expand on knowledge of circuits, and to understand how variable resistors work. Children will also learn about how to measure electric charge and then consider the impact of conductors and insulators on an electric circuit.

Knowledge	Skills
<p>I can associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</p> <p>I can compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers, the on/off position of switches.</p> <p>I can use recognised symbols when representing a simple circuit in a diagram.</p> <p>Challenge: Can they make their own traffic light system or something similar?</p>	<p>Draw circuit diagrams of a range of simple series circuits, using recognised symbols.</p> <p>Communicate structures of circuits using circuit diagrams with recognised symbols</p> <p>Make electric circuits and demonstrate, following investigation, how variation in the working of particular components can be changed.</p> <p>Plan and select resources for a fair scientific enquiry, deciding which variables to control.</p> <p>Record results from an experiment using tables and graphs</p> <p>Evaluate and explain their investigation, results and conclusions.</p>



Unit	Year 6: Electricity	
National Curriculum	Pupils should be taught to: <ul style="list-style-type: none"> <li>• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</li> <li>• Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</li> <li>• Use recognised symbols when representing a simple circuit in a diagram</li> </ul>	
Prior Learning		Future Learning
Identify common appliances that run on electricity. (Y4 - Electricity) Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. (Y4 - Electricity) Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. (Y4 - Electricity) Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (Y4 - Electricity) Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)		Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. (KS3) Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. (KS3) Differences in resistance between conducting and insulating components (quantitative). (KS3) Static electricity. (KS3)
Key Learning		Key Vocabulary
Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well. You can use recognised circuit symbols to draw simple circuit diagrams.		Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage  N.B. Children do not need to understand what voltage is, but will use volts and voltage to describe different batteries. The words "cells" and "batteries" are now used interchangeably.
Common Misconceptions	Some children may think: <ul style="list-style-type: none"> <li>• larger-sized batteries make bulbs brighter</li> <li>• a complete circuit uses up electricity</li> <li>• components in a circuit that are closer to the battery get more electricity.</li> </ul>	

# Knowledge Organiser

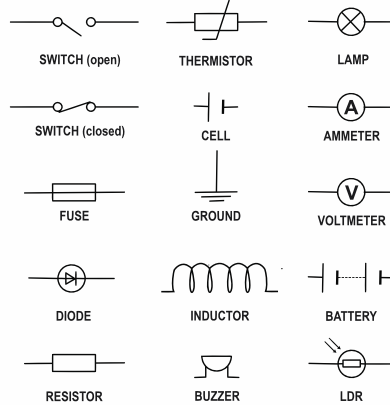
## Unit: Electricity

### Key Vocabulary

Key Word	Meaning
static electricity	Electricity that collects on the surface of an object, which can cause an electric shock.
filament	A thin piece of wire with a high melting point, used in bulbs.
voltage	An electric force which 'pushes' the electric current round the circuit.
insulator	A material which doesn't conduct electricity.
conductor	A material that electricity can flow through easily.
fuse	A safety device on a circuit that can stop current from flowing if it becomes overheated.
component	An individual part in an electronic circuit.
variable resistor	A device which varies the amount of electric current allowed to flow through a circuit.

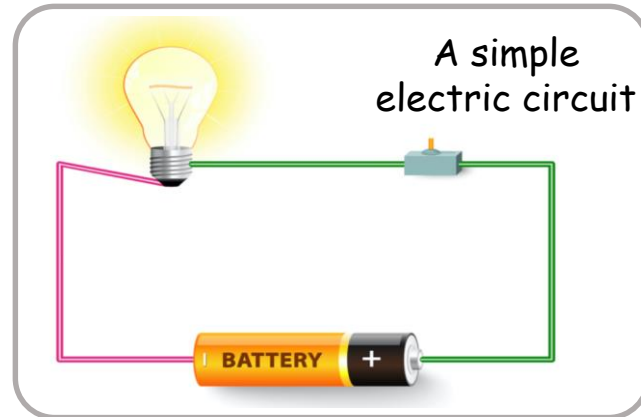
When a light is switched on, you are sending a flow of electrons around the circuit.

### Electric circuit symbols

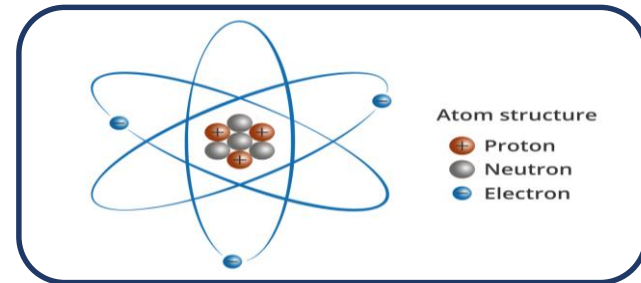


Metals such as copper, aluminium, zinc and gold are good conductors of electricity.

Light bulbs turn electricity into light due to resistance.



A simple electric circuit



### FACTOIDS: Can you find out more?

- Q1. How is static electricity created?  
Friction on an object creates an electric charge.
- Q2. How does a wind-up torch work?  
It works through a dynamo which turns mechanical energy to electrical energy through a simple electromagnet.
- Q3. How are insulators helpful?  
They prevent electric flow so you don't receive an electric shock!

- 1 • Can I explain how objects become charged?
- 2 Can I describe the parts of an electric circuit?
- 3 Can I explain what effects the output of a circuit?
- 4 • Can I compare electrical conductors and insulators?
- 5 • Can I build a set of traffic lights?
- 6 • How can variable resistor work like a switch?

This unit will help you explore different types of electricity as well as understanding what makes up a circuit. You will learn about this by studying circuit diagrams and by building your own circuits. You will also think about what materials conduct and which insulate, so you know about safety with electricity. It will also help you learn about the importance of saving energy. Understanding electricity is important for many careers which involve circuitry and installation of electrical devices. It is also helpful for being able to do quick jobs safely and with knowledge.

# Year 6 Electricity

Lesson Question	Skills	Knowledge	Lesson Overview	Summative Assessment Questions	Key Vocabulary
Can I explain how objects become charged?	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys tables, scatter graphs and / or bar and line graphs.	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit; compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches; use recognised symbols when representing a simple circuit in a diagram.	Explore ways of generating static electricity.		static electricity, charge, electric shock, friction, discharge
Can I describe the parts of an electric circuit?	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys tables, scatter graphs and / or bar and line graphs (over the two lessons).	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit; compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches; use recognised symbols when representing a simple circuit in a diagram	Building a circuit.		circuit, battery, component, series circuit, switch
Can I explain what effects the output of a circuit?	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys tables, scatter graphs and / or bar and line graphs (Over the two lessons)	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit; compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches; use recognised symbols when representing a simple circuit in a diagram	Write a report which explains the importance of generating a light source in different situations, using the following headings: Emergency Power, Convenient Power and Outdoor Power.		voltage, output, bulb, power, wind-up torch
Can I compare electrical conductors & insulators?	Plan different types of scientific enquiries to answer questions, recognise control variables where necessary	Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.	Exploring electrical conductors and insulators.		insulator, conductor, copper, short circuit, fuse
Can I build a set of traffic lights?	Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	Designing and making a set of traffic lights, a burglar alarm or some other useful circuit.	Apply your knowledge about electricity. Design and make your own traffic lights circuit.		signal, timer-based, synchronised, receiver, sensor
How can variable resistor work like a switch?	Take measurements, use a range of scientific equipment, with increasing accuracy and precision and take repeat readings	Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches	Investigate how increasing the number of components in a circuit will change the voltage which flows through it. Construct a circuit with a single 1.5v cell, switch and buzzer, and then increase the number of buzzers and record what happens.		dimmer switch, LED, adjust, variable resistor, resistor

# Animals, Including Humans

Oracy Outcome:

Year Group	Oracy Skills – Learning <i>to</i> talk	Oracy Skills – Learning <i>through</i> talk	Oracy Outcome			
	Physical, Linguistic, Cognitive, Social & Emotional	Subject specific skills	Purpose	Audience	Outcome (link to topic)	Resources
6 – Heart and Health	<b>Physical</b> - To have a stage presence. <b>Physical</b> - To adjust tone, volume and pace for a given purpose and audience. <b>Linguistic</b> - To vary sentence structures and length for effect when speaking.	<b>Cognitive</b> - To construct a detailed argument based on scientific evidence.	To persuade and influence	Parents  Recorded and uploaded on YouTube	<b>Public Service Announcement – How to keep a healthy heart</b>	Always, Sometimes, Never, Talking points, Concept Cartoon. Vocabulary bullseye.

# Knowledge Organiser

## Unit: Animals, Including Humans

### Key Vocabulary

Key Word	Meaning
transfusion	The process of adding an amount of blood to the body.
plasma	A thin yellow liquid which the formed elements are suspended in.
pancreas	A gland which sits behind the stomach, produces enzymes for digestion.
diabetes	A condition that occurs when the body can't use glucose.
transportation	The movement of something from one place to another.
spleen	An organ which removed damaged red blood cells from the blood.
alveoli	Tiny sacks which in the lungs which fill with air to allow oxygen to enter the blood.
bacteria	A type of microscopic unicellular organism.

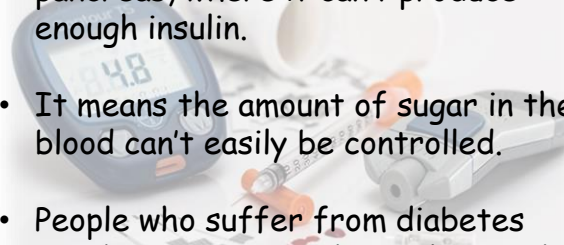
Bacteria can help break down decaying material so nutrients are free to be used by plants.

A phlebotomist is the name give to a nurse who takes blood samples to find a diagnosis.

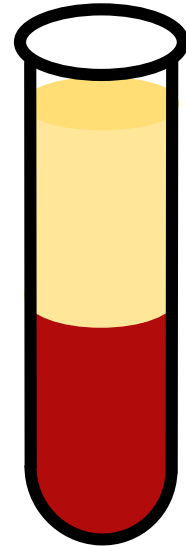
Karl Landsteiner was a scientist who found that there is more than one blood type in humans.

### Diabetes

- Diabetes is an illness of the pancreas, where it can't produce enough insulin.
- It means the amount of sugar in the blood can't easily be controlled.
- People who suffer from diabetes may have to inject themselves with insulin.



### Our blood



Plasma

Formed elements

- Red blood cells
- White blood cells
- Platelets



### FACTOIDS:

Can you find out more?

Q1. What is blood?

Blood is composed of a liquid called plasma, red blood cells, white blood cells and platelets.

Q2. Are all bacteria bad?

No! The bacteria which lives in our gut helps us stay healthy.

Q3. Why does blood need to be filtered?

To removed damaged red blood cells and to remove substances which could make us ill.

1

• Can I understand the function o the heart and its role in the circulatory system?

2

Can I identify and compare blood vessels?

3

Can I explore the composition of blood?

4

• Can I learn how the body transports water and nutrients?

5

Can I learn how the body transports water and nutrients?

6

Can I learn about the impact of drugs and alcohol on the body?

This unit will help you learn about blood and how our body looks after it. You will learn about some diseases that can't be avoided and some that can, by leading a healthy lifestyle. You will also begin thinking about bacteria and how some types of bacteria help us stay healthy.

This may help you think about your own lifestyle and think about how to stay fit and healthy in your teenage and adult years.



<b>Unit</b>	<b>Year 6: Animals, Including Humans</b>	
<b>National Curriculum</b>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>• identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</li> <li>• Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</li> <li>• Describe the ways in which nutrients and water are transported within animals, including humans.</li> </ul>	
<b>Prior Learning</b>		<b>Future Learning</b>
<p>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)</p> <p>Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans)</p> <p>Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)</p> <p>Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)</p>		<p>The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3)</p> <p>The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3)</p> <p>The structure and functions of the gas exchange system in humans, including adaptations to function. (KS3)</p> <p>The mechanism of breathing to move air in and out of the lungs. (KS3) • The impact of exercise, asthma and smoking on the human gas exchange system. (KS3)</p>
<b>Key Learning</b>		<b>Key Vocabulary</b>
<p>The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.</p> <p>Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins. This content is also included in PSHE.</p>		<p>Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle</p>
<b>Common Misconceptions</b>	<p>Some children may think:</p> <ul style="list-style-type: none"> <li>• your heart is on the left side of your chest</li> <li>• the heart makes blood</li> <li>• the blood travels in one loop from the heart to the lungs and around the body</li> <li>• when we exercise, our heart beats faster to work the muscles more</li> <li>• some blood in our bodies is blue and some blood is red</li> <li>• we just eat food for energy</li> <li>• all fat is bad for you</li> <li>• all dairy is good for you</li> </ul>	

# Year 6 Animals, Including Humans

Lesson Question	Skills	Knowledge	Lesson Overview	Summative Assessment Questions	Key Vocabulary
Can I understand the function of the heart and its role in the circulatory system?	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs and bar and line graphs	Identify and name the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood	<ul style="list-style-type: none"> <li>Describe the structure and function of the heart</li> <li>Identify oxygenated and deoxygenated blood</li> <li>Describe how the blood moves around the heart</li> </ul>		circulatory system atrium ventricle vessel valves
Can I identify and compare blood vessels?	Taking measurements and using a range of scientific equipment, with increasing accuracy and precision; taking repeat readings when appropriate	Identify and name the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood	<ul style="list-style-type: none"> <li>Define the function of different blood vessels</li> <li>Explore issues surrounding restricted arteries</li> <li>Explain the movement of blood through the heart</li> </ul>		vessel artery vein capillary microscope
Can I explore the composition of blood?	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs and bar and line graphs	Identify and name the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood	<ul style="list-style-type: none"> <li>Describe the composition of the blood</li> <li>Create a pie chart to explain the composition of the blood</li> <li>Explain the function of cells within the blood</li> <li>.</li> </ul>		blood plasma platelet white blood cell red blood cell
Can I learn how the body transports water and nutrients?	Identifying scientific evidence that has been used to support or refute ideas or arguments	Describe the ways in which nutrients and water are transported within animals, including humans	<ul style="list-style-type: none"> <li>Explain how water and nutrients are transported</li> <li>Define osmosis and diffusion</li> <li>Explain the importance of diffusion and osmosis</li> </ul>		absorb diffusion osmosis concentration nutrient
Can I investigate what affects your heart rate?	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function	<ul style="list-style-type: none"> <li>Accurately measure pulse</li> <li>Design an investigation associated with heart rate, diet and exercise</li> <li>Describe how lifestyle choices can affect health</li> </ul>		diet exercise heart rate BPM - beats per minute pulse
Can I learn about the impact of drugs and alcohol on the body?	Reporting and presenting findings from enquiries - including conclusions, causal relationships and explanations of and a degree of trust in results - in oral and written forms such as displays and other presentations	Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function	<ul style="list-style-type: none"> <li>Define the uses of different drugs</li> <li>Describe the impact of drugs/alcohol on health</li> <li>Describe some drugs used to support the circulatory system</li> </ul>		stimulant depressant hallucinogen painkiller drug

# Evolution and Inheritance

# Knowledge Organiser

## Unit: Evolution and Inheritance

Humans are 99.9% all the same, but the other 0.1% contains enough DNA information to make us all different!

Some animals are bred to make products and others for scientific research.

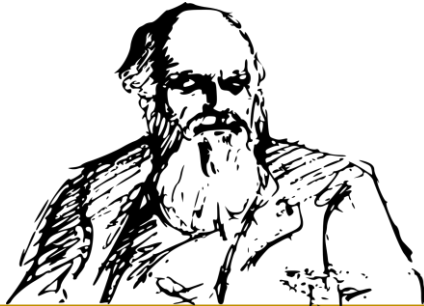
Animals can also be bred for cultural or ethical reasons, or to be kept as pets.

### Key Vocabulary

Key Word	Meaning
evolution	A process of formation, growth or development.
inheritance	A quality, characteristic or trait which is passed down generations.
DNA	The material in chromosomes that transfers genetic information in all life forms (Deoxyribonucleic acid).
natural selection	Coined by Charles Darwin, it means the survival and reproduction of the fittest species.
ancestor	A person from whom one is descended.
husbandry	The care, cultivation and breeding of crops and animals.
generation	A group of individuals belonging together at the same time period.
fossilisation	The process of an animal or plant being turned to stone.

### Charles Darwin and Natural Selection

- Different species of animal had evolved from one shared ancestor.
- Animals had adapted to suit the habitats and environments they live in.
- Those animals that didn't adapt had become extinct. Called the 'Survival of the Fittest.'
- Many religious people were angry at his theory to start with.



### Genetic Modification

Pros	Cons
<ul style="list-style-type: none"> <li>• Can protect crops and mean the produce has less disease.</li> <li>• The produce can be bigger and tastier</li> <li>• Can mean lower cost to consumer.</li> </ul>	<ul style="list-style-type: none"> <li>• We don't know the long-term effects of safety</li> <li>• Research isn't yet finished</li> <li>• Could cause more allergies or diseases for consumers</li> </ul>



### FACTOIDS:

#### Can you find out more?

Q1. What is a GM crop?  
This means 'genetically modified' and is one which scientists have altered to protect against disease.

Q2. Who was Mary Anning?  
A famous palaeontologist who discovered lots of fossils.

Q3. What are fossils?  
Casts of dead organisms who were alive millions of years ago.

1

• Can I explain how adaptations help animals and plants survive?

2

Can I explain what fossils can tell us?

3

Can I describe the process of genetic modification?

4

• Can I explain why animals can look different to their parents?

5

• Can I describe the process of natural selection?

6

• Can I explore the work of palaeontologist Mary Anning?

This unit is designed to help you learn about the history of organisms (animals and plants) and how they need to adapt to survive. From Darwin's theory of natural selection, to genetic modification and cloning today, you will gain an understanding of how inheritance and genetics works.

You will also gain an understanding of what history tells us, such as fossils and geology. It really is a fascinating subject to see how life on earth has evolved over all these years!

Unit	Year 6: Evolution and Inheritance	
National Curriculum	Pupils should be taught to: <ul style="list-style-type: none"> <li>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</li> <li>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</li> <li>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</li> </ul>	
Prior Learning		Future Learning
<p>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 - Living things and their habitats)</p> <p>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)</p> <p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)</p> <p>Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)</p> <p>Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5)</p>		<p>Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3)</p> <p>A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. (KS3)</p> <p>The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. (KS3)</p> <p>Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. (KS3)</p>
Key Learning		Key Vocabulary
<p>All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other.</p> <p>Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time, these inherited characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.</p> <p>Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics</p>		<p>offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils, evolve, evolution</p>
Common Misconceptions	Some children may think: <ul style="list-style-type: none"> <li>adaptation occurs during an animal's lifetime: giraffes' necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life</li> </ul>	



# Year 6 Evolution and Inheritance

Lesson Question	Skills	Knowledge	Lesson Overview	Summative Assessment Questions	Key Vocabulary
Can I explain how adaptations help animals and plants survive?	Identify scientific evidence that has been used to support or refute ideas or arguments	Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution	Create your own animal that would be well adapted to survive in the desert.		adaptation, desert, cactus, insulating, environment
Can I explain what fossils can tell us?	Identify scientific evidence that has been used to support or refute ideas or arguments	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.	Review the handout and answer the questions.		fossil, fossilisation, evidence, dinosaur, petrified
Can I describe the process of genetic modification?	Identifying scientific evidence that has been used to support or refute ideas and arguments	Recognise that living things produce offspring of the same kind, but that offspring normally vary and are not identical to their parents.	Hold a debate on GM crops.		genetically modified crops, toxin, resilience, breeding, yield
Can I explain why animals can look different to their parents?	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.	Extract the DNA from a banana.		generation, species, evolution, offspring, DNA
Can I describe the process of natural selection?	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	Identify how animals and plants are adapted to suit their environment in different ways, and that adaptation may lead to evolution, and find out more about how living things on Earth have changed over time, and find out about the work of palaeontologists such as Mary Anning, and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.	Camouflaged Worms.		Charles Darwin, habitat, ancestor, Natural Selection, extinct
Can I explore the work of palaeontologist Mary Anning?	Identify scientific evidence that has been used to support or refute ideas or arguments	Find out about the work of palaeontologists such as Mary Anning; recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.	Create a fossil using simple materials!		Mary Anning, specimen, prehistoric, Jurassic Coast, palaeontologist