

Year 6
Science:
Autumn 1
Biology - Classification

Previous learning

In Year 5, children group and sort plants by how they reproduce. In Year 2, children identified and named a variety of plants and animals in a range of habitats and Microhabitats. In Year 1, children identified, compared, grouped and sorted a variety of common wild and garden plants, including deciduous and evergreen trees, based on observable features.

This project teaches the children that classification is the grouping of living and non-living things with similar characteristics. They learn how to sort and group using existing classification keys and observe how a key can be produced.

Substantive Knowledge in Science	Disciplinary knowledge in Science
<p>Classification keys help us identify living things based on their physical characteristics.</p> <p>An adaptation is a physical or behavioural trait that allows a living thing to survive and fill an ecological niche.</p> <p>Adaptations evolve by natural selection.</p> <p>Favourable traits help an organism survive and pass on their genes to subsequent generations.</p>	<p>Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p> <p>Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <p>Use test results to make predictions to set up further comparative and fair tests.</p> <p>Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.</p> <p>Identify scientific evidence that has been used to support or refute ideas or arguments.</p>
Lesson 1	<p>Classification - plants and animals and micro-organisms</p> <ul style="list-style-type: none"> To describe how living things are classified into broad groups according to common observable characteristics.
Lesson 2	<p>Classification - micro-organisms</p> <ul style="list-style-type: none"> To describe how living things are classified into broad groups according to common observable characteristics (micro-organisms).
Lesson 3	<p>Classification keys - plants</p> <ul style="list-style-type: none"> To use and construct classification systems to identify plants from a range of habitats.
Lesson 4	<p>Classification keys - animals</p> <ul style="list-style-type: none"> To use and construct classification systems to identify animals from a range of habitats.
Lesson 5	<p>Adaptations</p> <ul style="list-style-type: none"> To identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Lesson 6	Polar adaptations
	<ul style="list-style-type: none"> To ask and answer deeper and broader scientific questions about the local and wider world that build on and extend their own and others' experiences and knowledge.
Vocabulary	
microorganism, germ, microbe, ancestry, genetic comparison	

**Year 6
Science:
Autumn 2
Physics - Electrical Circuits and Components**

Previous learning

In Year 4, children learnt that a series circuit is a simple loop with only one path for the electricity to flow. They learnt that a series circuit must be a complete loop to work and have a source of power from a battery or cell. In Year 3, children learnt that switches open and close a circuit and provide control.

This project teaches children about electrical circuits, their components and how they function. They recognise how the voltage of cells affects the output of a circuit and record circuits using standard symbols. It also teaches children about programmable devices, sensors and monitoring. They combine their learning to design and make programmable home devices.

Substantive Knowledge in Science	Disciplinary knowledge in Science
<p>An electric current is the flow of electric charge around a circuit.</p> <p>The electric current flows from the cell through all the components and back to the cell.</p> <p>Electric current is measured using an ammeter.</p> <p>The force that pushes electric charge around a circuit, called the voltage, is measured using a voltmeter.</p>	<p>Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p> <p>Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <p>Use test results to make predictions to set up further comparative and fair tests.</p> <p>Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.</p> <p>Identify scientific evidence that has been used to support or refute ideas or arguments.</p>

Lesson 1	Recognised circuit symbols
	<ul style="list-style-type: none"> To use recognised symbols when representing a simple circuit in a diagram.
Lesson 2	Recording circuits
	<ul style="list-style-type: none"> To create circuits using a range of components and record diagrammatically using the recognised symbols for electrical components.
Lesson 3	Exploring circuit components
	<ul style="list-style-type: none"> To investigate how circuit components function and what happens when components in series circuits are changed and added to.
Lesson 4	Voltage and cells
	<ul style="list-style-type: none"> To use a voltmeter or multimeter to measure the actual voltage of the cells, recording the data in the table and then completing the tasks and questions.
Lesson 5	Investigating voltage

	<ul style="list-style-type: none"> To explain how the brightness of a lamp or volume of a buzzer is affected by the number and voltage of cells used in a circuit.
Lesson 6	Programming tasks
	<ul style="list-style-type: none"> To demonstrate how programs run in an exact order by following a sequence of instructions, and test and debug programs.
Vocabulary	
voltage, volts, electrons, lamp, buzzer, motor	

Year 6
Science:
Spring 1
Biology - Evolution and Inheritance

Previous learning

In Year 5, children learnt that Humans reproduce sexually, which involves two parents (one female and one male) and produces offspring that are different from the parents. In Year 4, children learnt that fossils form over millions of years and are the remains of a once-living organism, preserved as rock. In Year 2, children learnt that human offspring go through different stages as they grow to become adults.

This project teaches children how living things on Earth have changed over time and how fossils provide evidence for this. They learn how characteristics are passed from parents to their offspring and how variation in offspring can affect their survival, with changes (adaptations) possibly leading to the evolution of a species.

Substantive Knowledge in Science	Disciplinary knowledge in Science
<p>There are five kingdoms: animals, plants, fungi, protists and monerans.</p> <p>Scientists compare fossilised remains from the past to living species that exist today to hypothesise how living things have evolved over time.</p> <p>The theory of evolution was developed in the 19th century by the naturalists Charles Darwin and Alfred Russel Wallace. It states that: all life on Earth has evolved from simple life forms to more complex ones over time.</p> <p>Inheritance is when living things pass on characteristics following sexual reproduction, such as height, skin colour and eye colour.</p>	<p>Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p> <p>Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <p>Use test results to make predictions to set up further comparative and fair tests.</p> <p>Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.</p> <p>Identify scientific evidence that has been used to support or refute ideas or arguments.</p>

Lesson 1	Classification and reasoning
	<ul style="list-style-type: none"> To classify living things, including microorganisms, animals and plants, into groups according to common observable characteristics and based on similarities and differences.
Lesson 2	Classifying fossils
	<ul style="list-style-type: none"> To recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
Lesson 3	Theory of evolution

	<ul style="list-style-type: none"> To explain that living things have changed over time, using specific examples and evidence.
Lesson 4	Inheritance
	<ul style="list-style-type: none"> To identify that living things produce offspring of the same kind, although the offspring are not identical to either parent.
Lesson 5	Natural selection and survival of the fittest
	<ul style="list-style-type: none"> To identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
Lesson 6	Artificial selection
	<ul style="list-style-type: none"> To describe how animals and plants can be bred to produce offspring with specific and desired characteristics (selective breeding).
Vocabulary	
natural selection, identical, genes, Charles Darwin, ancestor, common ancestor, deoxyribonucleic acid (DNA), evolutionary tree diagram, evolve	

Year 6 Science: Spring 2 Biology - Circulatory System (1)	
Previous learning	
<p>In Year 5, the children learned about human reproduction. In Year 4, the children learned that the digestive system is responsible for digesting food and absorbing nutrients and water. They learned that there are different types of teeth in humans and about their simple functions. The children learnt that for sound to reach the ear, sound waves travel through a medium, such as air or water. In Year 3, children learned that humans have a skeleton and muscles for movement, support and protecting organs. They learned that humans need the right types and amount of nutrition, and that they cannot make their own food. In Year 2, children learned that human offspring go through different stages as they grow to become adults. They learnt that it is important that humans exercise, eat the right amounts of different types of food, and have good hygiene.</p> <p>This project teaches children about the transport role of the human circulatory system, its main parts and primary functions. They learn about healthy lifestyle choices and the effects of harmful substances on the body.</p>	
Substantive Knowledge in Science	Disciplinary knowledge in Science
<p>The circulatory system includes the heart, blood vessels and blood.</p> <p>There are three types of blood vessels: arteries, veins and capillaries. They each have a different-sized hole (lumen) and walls.</p> <p>The heart has four chambers: the right atrium, left atrium, right ventricle and left ventricle.</p> <p>Blood is made up of four different components: plasma, platelets, red blood cells and white blood cells.</p> <p>Arteries carry blood away from the heart, providing the tissues and organs with oxygen and other nutrients.</p>	<p>Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p> <p>Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <p>Use test results to make predictions to set up further comparative and fair tests.</p> <p>Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.</p> <p>Identify scientific evidence that has been used to support or refute ideas or arguments.</p>
Lesson 1	Bodily systems
	<ul style="list-style-type: none"> To describe the ways in which nutrients and water are transported within animals,

	including humans.
Lesson 2	Role of the circulatory system
	<ul style="list-style-type: none"> To identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.
Lesson 3	Structure and function of the heart
	<ul style="list-style-type: none"> To name and describe the purpose of the circulatory system and the functions of the heart.
Lesson 4	The function of blood
	<ul style="list-style-type: none"> To describe the ways in which nutrients and water are transported within animals, including humans.
Lesson 5	The structure and function of blood vessels
	<ul style="list-style-type: none"> To describe the structure and function of each type of blood vessel.
Lesson 6	Measuring heart rate
	<ul style="list-style-type: none"> To record data in a table and calculate the beats per minute (bpm).
Vocabulary	
blood vessels, arteries, veins, capillaries, lumen, red blood cells, white blood cells, infection	

Year 6 Science: Spring 2 Biology - Circulatory System (2)	
Previous learning	
<p>In Year 5, the children learned about human reproduction. In Year 4, the children learned that the digestive system is responsible for digesting food and absorbing nutrients and water. They learned that there are different types of teeth in humans and about their simple functions. The children learnt that for sound to reach the ear, sound waves travel through a medium, such as air or water. In Year 3, children learned that humans have a skeleton and muscles for movement, support and protecting organs. They learned that humans need the right types and amount of nutrition, and that they cannot make their own food. In Year 2, children learned that human offspring go through different stages as they grow to become adults. They learnt that it is important that humans exercise, eat the right amounts of different types of food, and have good hygiene.</p> <p>This project teaches children about the transport role of the human circulatory system, its main parts and primary functions. They learn about healthy lifestyle choices and the effects of harmful substances on the body.</p>	
Substantive Knowledge in Science	Disciplinary knowledge in Science
<p>The circulatory system includes the heart, blood vessels and blood.</p> <p>There are three types of blood vessels: arteries, veins and capillaries. They each have a different-sized hole (lumen) and walls.</p> <p>The heart has four chambers: the right atrium, left atrium, right ventricle and left ventricle.</p> <p>Blood is made up of four different components: plasma, platelets, red blood cells and white blood cells.</p> <p>Arteries carry blood away from the heart, providing the tissues and organs with oxygen and other nutrients.</p>	<p>Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p> <p>Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <p>Use test results to make predictions to set up further comparative and fair tests.</p> <p>Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.</p> <p>Identify scientific evidence that has been used to support or refute ideas or</p>

	arguments.
Lesson 1	Proving a hypothesis
	<ul style="list-style-type: none"> To prove or disprove a hypothesis by collecting data.
Lesson 2	Heart rate investigation
	<ul style="list-style-type: none"> To plan and carry out a range of enquiries.
Lesson 3	Benefits of exercise
	<ul style="list-style-type: none"> To know the benefits of physical exercise, time outdoors, community participation, voluntary and service-based activity on mental wellbeing and happiness.
Lesson 4	Classifying foods
	<ul style="list-style-type: none"> To classify food using traffic light nutrition labels and prior knowledge.
Lesson 5	Healthy diet
	<ul style="list-style-type: none"> To know what constitutes a healthy diet (including understanding calories and other nutritional content).
Lesson 6	Poor diet and lifestyle
	<ul style="list-style-type: none"> To know the characteristics of a poor diet and risks associated with unhealthy eating and other behaviours (including obesity and drugs).
Vocabulary	
aerobic exercise, alcohol, balancing exercises, blood pressure, carbohydrate, cholesterol, diet, drugs, Eatwell guide, exercise, healthy, muscles, processed food, protein, saturated fat, smoking, strengthening exercises, stretching exercises, unhealthy, unsaturated fat, weight	

Year 6 Science: Summer 1 & 2 (Possible disruption due to SATS, Secondary school transition, residential) Physics - Light Theory	
Previous learning	
<p>In Year 3, children learnt that light from the Sun is damaging for vision and the skin. Shadows change shape and size when the light source moves. Children noticed that light is reflected from surfaces and that we need light in order to see things and that dark is the absence of light. Children recognised that shadows are formed when the light from a light source is blocked by an opaque object and find patterns in the way that the size of shadows change. In Year 2, children learnt that plants need water, light and a suitable temperature to grow and stay healthy.</p> <p>This project teaches children about the way that light behaves, travelling in straight lines from a source or reflector, into the eye. They explore how we see light and colours, and phenomena associated with light, including shadows, reflections and refraction.</p>	
Substantive Knowledge in Science	Disciplinary knowledge in Science
<p>Light travels in waves in straight lines.</p> <p>Light sources give out light. They can be natural or artificial.</p> <p>The angle at which light hits a reflective surface is the same angle at which it is reflected.</p> <p>Refraction is the bending of light as it passes from one transparent material to another.</p>	<p>Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p> <p>Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <p>Use test results to make predictions to set up further comparative and fair tests.</p>

Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.

Identify scientific evidence that has been used to support or refute ideas or arguments.

Lesson 1	How does light travel? <ul style="list-style-type: none">To identify that light travels in straight lines.
Lesson 2	How do we see? <ul style="list-style-type: none">To explain how we can see things (give out or reflecting light into the eye).
Lesson 3	Shadows <ul style="list-style-type: none">To explain (using words, diagrams or a model) why shadows have the same shape as the objects that cast them and how shadows can be changed.
Lesson 4	Reflections <ul style="list-style-type: none">To describe how light behaves when reflected off a mirror (plane, convex or concave) and when passing through a lens (concave or convex).
Lesson 5	Measuring light <ul style="list-style-type: none">To use data loggers to take accurate measurements of light.
Lesson 6	Refraction <ul style="list-style-type: none">To describe, using scientific language, phenomena associated with refraction of light (prisms).

Vocabulary

natural, artificial, absorbed, scattered, reflected, optic nerve, retina, transmitted, fossilised remain, prism