

Science Long Term Overview – Broken Down into Small Steps

Year 6

Unit	Learning Objectives	Disciplinary Knowledge	Substantive Knowledge
Living Things & Their Habitats	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.	Identifying scientific evidence that has been used to support or refute ideas or arguments.	A living organism moves, reproduces, grows and excretes. The stem of a plant moves towards the strongest light source and the roots move away from light. Plants can reproduce sexually and asexually.
	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants, and animals.	Use and develop keys and other information records to identify, classify and describe living things (non-statutory).	Vertebrates can be grouped as mammals, birds, fish, amphibians and reptiles. Plants can be grouped as flowering and non-flowering. Flowering plants produce flowers and fruits. Non-flowering plants do not. Scientists group organisms to organise animals and plants based on their features. Grouping organisms can help us understand how organisms are related to each other.
	Give reasons for classifying plants and animals based on specific characteristics.	Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment (non-statutory).	Classification keys are used to classify animals. Classification keys can be used to identify different unknown animals based on their features, such as number of legs, having fur or scales. A classification key is made up of several questions with yes or no answers. These questions can then lead to further questions and answers until the identity of the animal is determined.
	Give reasons for classifying plants and animals based on specific characteristics.	Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment (non-statutory).	Classification keys can be used to classify plants. They can be used to identify different unknown plants based on their features. Plants can be classified in several ways. Trees can be classified as deciduous, evergreen and coniferous.
	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.	Identifying scientific evidence that has been used to support or refute ideas or arguments.	A microorganism is tiny and can be seen using a powerful microscope. Bacteria are simple, invisible (to the eye) microorganisms. Some bacteria can cause diseases and infections. Humans have good bacteria in their bodies which help to digest food. Viruses are invisible (to the eye) microorganisms and need a host. They can cause diseases such as flu or a common cold. Some fungi are microorganisms which may cause infections. Some can be involved in bread making.
	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.	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.	Microorganisms such as bacteria, viruses and fungi can be classified. The classification of microorganisms is based on their features or characteristics such as shape. Bacteria, viruses and fungi have different shapes
	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.	Use relevant scientific language and illustrations to discuss, communicate and justify their ideas and should talk about how scientific ideas have developed over time (non-statutory).	Carl Linnaeus was a Swedish botanist who wrote a book called Systema Naturae or System of Nature. Linnaeus was famous for developing the first system to classify animals. The classification was based on physical characteristics. Carl Linnaeus divided animals into six classes. These were mammals, birds, amphibians, fish, insects and worms.
Electricity	Use recognised symbols when representing a simple circuit in a diagram.	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	A series circuit is where all the components are in one continuous loop. Components in a series circuit include the battery, buzzers, wires, bulbs and switches. Each component in a circuit has a symbol. Current is the flow of electricity in a circuit. Voltage causes the current to flow.
	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.	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.	For a circuit to be complete, all the components, including a battery, are connected by wires and the switch is closed. An incomplete circuit may have a break in the wires, a switch may be open or the battery is the wrong way in the holder. The current does not flow at all in an incomplete 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.	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	The more components there are in a circuit, the dimmer the bulbs and the quieter the buzzers. The more components there are in a circuit, the more difficult it is for current to flow.
	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	N/A
	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.	N/A
	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.	Using test results to make predictions to set up further comparative and fair tests.	N/A
Renewable Energy	N/A	Identifying scientific evidence that has been used to support or refute ideas or arguments.	Solar power uses light energy from the Sun to generate electricity. Wind power uses wind to generate electricity. Solar and wind power are renewable energy sources. This means that they do not run out. Fossil fuels used to generate electricity are a non-renewable energy source. This means that fossil fuels will eventually run out.
	N/A	Reporting and presenting findings from enquiries in oral and written forms such as displays and other presentations.	In the UK, burning fossil fuels to generate electricity is the largest source of greenhouse gas emissions. Emissions of greenhouse gases lead to the greenhouse effect and global warming. Renewable energy sources, such as solar and wind energy, can help limit the impact of global warming.

Light	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 relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).	Luminous objects emit light and non-luminous objects do not emit light. Humans can see objects because a light source produces light. Light reflects from an object to the eye. Light passes through the pupil to the retina.
	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.	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	Light travels in straight lines. Light travels from a light source to an object. The light rays reflect from the object to the eye. A reflection is where light rays bounce off an object.
	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	Light travels in straight lines. When light rays from a light source travel to an opaque object, they cannot pass through and a shadow is formed. The blocked light rays create an area of darkness behind the object, which is the shadow. The shape of a shadow is determined by the shape of the object that blocks the light. Shadows are always dark because they are areas from which light has been blocked.
	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	N/A
	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.	N/A
	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	N/A
	Recognise that light appears to travel in straight lines.	Identifying scientific evidence that has been used to support or refute ideas or arguments.	Light travels in straight lines. When light passes from one medium to another, it can change direction. This is called refraction. Refraction happens because light travels at different speeds in different substances. A pencil looks bent when it is put into water, because light travels at a different speed in water than it does in the air.
	Recognise that light appears to travel in straight lines.	Talk about how scientific ideas have changed over time (non-statutory).	White light is composed of a mixture of colours. Isaac Newton and Ibn al-Haytham discovered that white light is made up of different colours. A rainbow is a spectrum of light formed when sunlight passes through, and is refracted by, raindrops.
Light Pollution	N/A	Identifying scientific evidence that has been used to support or refute ideas or arguments.	Glare, light trespass and skyglow are all types of light pollution. Glare is caused by brightness from car or vehicle headlights. Light trespass is where light shines into areas it is not intended to. Skyglow is the brightening of the sky at night.
	N/A	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.	There are ways to reduce our light emissions. Turning off lights, devices, appliances and machines, unplugging electronic equipment and using natural light as much as possible helps to reduce light pollution.
The Circulatory System	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.	Explore ideas and raise different kinds of questions (non-statutory).	The circulatory system moves blood around the body. It is made up of the heart, blood vessels and blood. The blood vessels that move blood towards the heart are called veins. The blood vessels that move blood away from the heart are called arteries. Capillaries are small blood vessels that link veins and arteries together.
	Describe the ways in which nutrients and water are transported within animals, including humans.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).	Blood transports nutrients and oxygen to all parts of the body, and takes waste, such as carbon dioxide, away. Nutrients are carried in the plasma to provide the nourishment cells need to repair themselves and grow. Oxygen is carried in red blood cells from the lungs to all cells in our body. White blood cells help to fight bacteria and viruses in our body to prevent illness.

	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).	The heart is part of the circulatory system. The heart is a muscle which beats regularly. As the heart beats, it pumps blood around the body. The heart is split into four chambers. It has two atria and two ventricles.
	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).	Blood flows through the heart as part of its journey through the circulatory system. Veins carry blood towards the heart. They have valves to stop the blood flowing in the wrong direction. Blood then flows through the right atrium, then out of the right ventricle to the lungs. Blood from the lungs then flows into the left atrium and out of the left ventricle towards the rest of the body.
	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).	Oxygenated blood is blood that carries lots of oxygen. Deoxygenated blood is blood that has little oxygen in it. Oxygenated blood mostly travels from the heart through the arteries. Deoxygenated blood mostly travels from the parts of the body back to the heart, through veins.
	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.	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.	The left ventricle is thicker than the right ventricle because moving blood around the whole body requires more force than moving blood to the lungs.
Diet, Drugs & Lifestyle	Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.	Identifying scientific evidence that has been used to support or refute ideas or arguments.	A balanced diet is made up of the right amounts of carbohydrates, fats, proteins, vitamins, minerals, fibre and water. Fats can be classified as unsaturated, saturated or trans fats. Unsaturated fats provide the body with energy and allow humans to absorb some vitamins. Saturated and trans fats can cause weight gain and heart disease.
	Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.	Recognise which secondary sources will be most useful to research their ideas and begin the separate opinion from fact (non-statutory)	A drug is a chemical that can change the way your body or brain functions. Painkillers help the body to dull pain. Stimulants make a person feel more alert and awake. Depressants make the body feel calm and drowsy. Some drugs are legal and some are illegal.
	Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.	Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact (non-statutory).	Cigarettes contain tar, nicotine and other harmful substances. Tar is a sticky, brown substance which can cause cancer. Nicotine is highly addictive. Carbon monoxide is a poisonous gas that stops the blood carrying as much oxygen. Smoking can damage the body and cause breathing problems. It also increases the risks of heart and lung disease.
	Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	N/A
	Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.	N/A
	Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.	Using test results to make predictions to set up further comparative and fair tests.	N/A

Variation	Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).	An organism is a living thing such as an animal, plant, bacterium or fungus. A species is a group of similar organisms where two parents can create offspring. Variation is the differences between organisms. All species show variation.
	Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.	Recording data and results of increasing complexity, using scientific diagrams and labels, classification keys, tables, scatter graphs, bar charts and line graphs	Characteristics are the features of an organism, used to identify individuals or a group. Parents pass on characteristics to their offspring such as hair and eye colour. This process is called inheritance. Humans can breed animals such as dogs for desirable characteristics.
Adaptations	Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact (non-statutory).	Adaptations are characteristics which improve an animal's chances of survival in a habitat. Animals in cold environments have characteristics which allow them to survive. For example, they may have thick fur or blubber. Animals in desert environments have characteristics which allow them to survive in extreme heat. Some of these include thin fur and long eyelashes.
	Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Identifying scientific evidence that has been used to support or refute ideas or arguments.	Adaptations are characteristics which improve the chances of survival in a habitat. Plants in desert environments have longer roots and larger stems, so they can absorb and store more water. This allows them to survive in hot, dry environments such as deserts, where there is not much water available.
	Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact (non-statutory).	Evolution is a change in characteristics in animals and plants over a long period of time. Evolution allows animals and plants to better adapt to their environments or habitats so that they can survive. Evolution explains how animals and plants have developed over time from simpler life forms that lived millions of years ago.
	Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time (non-statutory).	Charles Darwin suggested the 'Theory of Evolution'. Darwin suggested that different species of animals had evolved from a shared ancestor. Darwin also suggested that organisms change their characteristics over a long period of time, so that they can successfully adapt to their environment or habitat.
	Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact (non-statutory).	Organisms have adapted over time to improve their chances of survival in a habitat. Organisms which are better adapted to their habitat are more likely to survive and reproduce. The characteristics that have enabled these individuals to survive are passed on to the next generation. This theory is called "natural selection".
	Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	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.	Darwin noticed that different finch species on the islands were closely related, but showed variations in beak type and body size. Some of the islands have a lot of plants which produce hard seeds and nuts. The differences in size and shape of the beaks meant that different species were well adapted to eating different foods, such as seeds, insects, flowers and fruits. Finches with long and pointed beaks catch and eat insects, while those with broad, short beaks crack seeds and nuts.
Fossils	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.	Identifying scientific evidence that has been used to support or refute ideas or arguments.	Fossils are formed when an animal or plant dies. When an animal dies the soft parts decompose and leave the skeleton. The skeleton is buried by sediment which compacts over time. Water seeps down into the rock and replaces the skeleton with minerals found in the water. This produces an imprint in a rock of a living thing.
	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time (non-statutory).	Where are older and new fossils found? What are the similarities between older and newer fossils? What are the differences between older and newer fossils? What can scientists learn by studying fossils? How do fossils show that organisms may have evolved over time?
	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.	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.	How are fossils formed? Who was Mary Anning? What did she discover? What challenges did Mary Anning face? How did Mary Anning's discoveries change our understanding of fossils and evolution?