

Also see [Practical Work Supporting Scientific Enquiry](#), [Outdoor Learning in the National Curriculum](#), [Science Making Links to the Foundation Subjects](#),

Y6	Autumn 1	Autumn 2	Spring 1	Spring 2/Summer 1	Summer 2
Topic	Electricity	Animals/ Humans, diet, exercise & Sex Education.	Light and sight	Living things-Microorganisms and Classification	Evolution and Inheritance
NC LINKS	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans 	<ul style="list-style-type: none"> 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. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
Prior Learning	<ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans) 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) Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans) Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans) 	<ul style="list-style-type: none"> Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light) Notice that light is reflected from surfaces. (Y3 - Light) 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) Find patterns in the way that the size of shadows change. (Y3 - Light) 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) 	<ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> 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) 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) Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats) Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5)
Future Learning	<ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3) The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3) The structure and functions of the gas exchange system in humans, including adaptations to function. (KS3) 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) 	<ul style="list-style-type: none"> The similarities and differences between light waves and waves in matter. (KS3) Light waves travelling through a vacuum; speed of light. The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. 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) Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. (KS3) Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. (KS3) 	<ul style="list-style-type: none"> Differences between species. (KS3) 	<ul style="list-style-type: none"> Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3) 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) The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. (KS3) 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)

Key Questions	<p>What is current electricity? Why do light bulbs or buzzers perform differently when more or less cells are used? What will make a buzzer/bulb louder or brighter? What will make a buzzer/bulb quieter or dimmer?</p>	<p>What are the main parts of the circulatory system and how does it work? What is the function of the blood and the heart? How are nutrients transported to the body? What are the impact of drugs on the body? What is the impact of exercise on the body?</p>	<p>How do we know that light travels in straight lines? How do we see objects? Why are shadows the same shape as the objects that cast them? Why do shadows appear elongated or shortened? What happens when light hits a prism? Why do objects in water appear bent?</p>	<p>What are the characteristics of the 5 main animal groups? How do keys work to classify animals? How can plant life be classified? What is a microorganism? How do we classify microorganisms? What is cold blooded/ warm blooded?</p>	<p>What evidence do we have of evolution and inheritance? What are adaptive and inherited traits? How have animals and plants adapted to their environment? What are the different types of fossils and what do they tell us?</p>
Key Learning	<p>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.</p>	<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. Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out 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. The new statutory requirements for relationships and health education can be found below: statutory guidance on Physical health and mental wellbeing (primary and secondary).</p>	<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. 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>Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other living 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.</p>	<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. 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. 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>
Possible evidence	<ul style="list-style-type: none"> • Can make electric circuits and demonstrate how variation in the working of particular components, such as the brightness of bulbs, can be changed by increasing or decreasing the number of cells or using cells of different voltages • Can draw circuit diagrams of a range of simple series circuits using recognised symbols 	<ul style="list-style-type: none"> • Can draw a diagram of the circulatory system and label the parts and annotate it to show what the parts do • Produces a piece of writing that demonstrates the key knowledge e.g. explanation text, job description of the heart 	<ul style="list-style-type: none"> • Can describe, with diagrams or models as appropriate, how light travels in straight lines either from sources or reflected from other objects into our eyes • Can describe, with diagrams or models as appropriate, how light travels in straight lines past translucent or opaque objects to form a shadow of the same shape 	<ul style="list-style-type: none"> • Can give examples of animals in the five vertebrate groups and some of the invertebrate groups • Can give the key characteristics of the five vertebrate groups and some invertebrate groups • Can compare the characteristics of animals in different groups • Can give examples of flowering and non-flowering plants 	<p>Can explain the process of evolution</p> <ul style="list-style-type: none"> • Can give examples of how plants and animals are suited to an environment • Can give examples of how an animal or plant has evolved over time e.g. penguin, peppered moth • Give examples of living things that lived millions of years ago and the fossil evidence we have to support this • Can give examples of fossil evidence that can be used to support the theory of evolution
Key Scientists	<p>See Scientists across the curriculum for information on historical figures, under-represented groups and modern scientists relating to each science topic.</p>				
Key Vocab	<p>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.</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>	<p>As for Year 3 - Light, plus straight lines, light rays</p>	<p>Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering</p>	<p>Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils</p>
Common Misconceptions	<p>Some children may think:</p> <ul style="list-style-type: none"> • larger-sized batteries make bulbs brighter • a complete circuit uses up electricity • components in a circuit that are closer to the battery get more electricity. 	<p>Some children may think:</p> <ul style="list-style-type: none"> • your heart is on the left side of your chest • the heart makes blood • the blood travels in one loop from the heart to the lungs and around the body • when we exercise, our heart beats faster to work the muscles more • some blood in our bodies is blue and some blood is red • we just eat food for energy • all fat is bad for you 	<p>Some children may think:</p> <ul style="list-style-type: none"> • we see objects because light travels from our eyes to the object. 	<p>Some children may think:</p> <ul style="list-style-type: none"> • all micro-organisms are harmful • mushrooms are plants. 	<p>Some children may think:</p> <ul style="list-style-type: none"> • 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 • offspring most resemble their parents of the same sex, so that sons look like fathers • all characteristics, including those that are due to actions during the parent’s life such as dyed hair or footballing skills, can be inherited • cavemen and dinosaurs were alive at the same time.

		<ul style="list-style-type: none"> • all dairy is good for you • protein is good for you, so you can eat as much as you want • foods only contain fat if you can see it • all drugs are bad for you. 			
Key Challenge		See Challenging more able pupils document			
Support		See Universal Offer document			
Visit or Visitor					
Key text					
Resources	<p>Wires, bulbs, buzzers, batteries, circuit breakers</p> <p>Alternative technology</p> <p>Flood alert (Upd8)</p> <p>Solar challenge</p> <p>Energy and the Global Goals</p> <p>Moja island</p>	<p>Stopwatches</p> <p>Let's talk-diet, diabetes, obesity</p> <p>Global health</p> <p>Pumpkins against poverty</p> <p>Stop the spread</p> <p>Marvellous microbes (video)</p> <p>Regreen the desert</p> <p>Pump it (video)</p> <p>Water!Water!</p> <p>Medicines from microbes</p>		<p>Marvellous microbes (video)</p> <p>Medicines from microbes</p>	<p>A rough guide to gas</p> <p>Smart bricks for smart plants</p>