



Science Progression Document – Upper KS2 Cycle B



Term 1: Evolution and Inheritance (Year 6 Unit)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
<p>Know about evolution and can explain what it is. Know how fossils can be used to find out about the past. 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- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</p>	<p>Life cycles have evolved to help organisms survive to adulthood. Over time the characteristics that are most suited to the environment become increasingly common.</p> <p>Note: Links can be made with the unit: Living things and their habitats.</p> <p>Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so. Organisms reproduce and offspring have similar characteristic patterns.</p>	<p>Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence,</p>	<p>Charles Darwin and Alfred Russel Wallace (Theory of Evolution by Natural Selection)</p> <p>Jane Goodall (Chimpanzees)</p>	<p>Across KS1 and 2: Understand there is a variety of life on Earth. Know that some animal's differences are important to their survival. Know how animals and plants reproduce. Know how fossils form over time.</p>	<p>KS3: Heredity as the process by which genetic information is transmitted from one generation to the next. The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation. The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. Changes in the environment may leave individuals within a species, and some entire species, less well</p>



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	Variation exists within a population (and between offspring of some plants). Competition exists for resources and mates.				adapted to compete successfully and reproduce, which in turn may lead to extinction. The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.
Key Question(s):	Working Scientifically opportunities:	Big Question - Assessment opportunity	Linked Texts		
<p>Why are we all different?</p> <p>What is variation, and why is it important?</p> <p>How did life begin on Earth?</p> <p>How do we change?</p> <p>What is evolution?</p> <p>What evidence is there for evolution?</p> <p>How does evolution happen?</p> <p>What reasons do animals become extinct?</p> <p>Polar Bears habitat is rapidly changing, what possible futures do they</p>	<p>Competitive tests - What is the most common eye colour in our class?</p> <p>Identify and Classify - Compare the skeletons of apes, humans, and Neanderthals - how are they similar, and how are they different? Can you classify these observations into evidence for the idea of evolution, and evidence against?</p>	<p>What is evolution, how does it happen and how do scientists know?</p>	<p>One Smart Fish (Christopher Wormell)</p> <p>The Molliebird (Jules Pottle)</p> <p>Our Family Tree (Lisa Westberg Peters)</p>		



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<p>face and can we predict which is most likely? How did Darwin come up with the theory? Why was his theory not initially accepted?</p>	<p>Observation Overtime - How has the skeleton of the horse changed over time?</p> <p>Pattern Seeking - Is there a pattern between the size and shape of a bird's beak and the food it will eat?</p> <p>Research - What happened when Charles Darwin visited the Galapagos islands? What ideas did American geneticist Barbara McClintock have about genes that won her a Nobel Prize?</p>				
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Term 2: Living Things and Their Habitats (Year 6 Unit)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
<p>Classify living things into broad groups according to observable characteristics and</p>	<p>Variation exists within a population (and between offspring of some plants) -</p>	<p>Variation Organisms Populations. Classification Characteristics</p>	<p>Carl Linnaeus (Identifying, Naming and Classifying Organisms)</p>	<p>Year 4: Recognise that living things can be grouped in a variety of ways.</p>	<p>KS3: The dependence of almost all life on Earth on the ability of</p>



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<p>based on similarities and differences. Give reasons for classifying plants and animals based on specific characteristics.</p>	<p>Note: Links can be made with the unit: Evolution and Inheritance. Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so. Organisms reproduce and offspring have similar characteristic patterns. Competition exists for resources and mates.</p>	<p>Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation. Classify, compare, bacteria, microorganism, organism, invertebrates, vertebrates, Linnaean.</p>		<p>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose danger to living things.</p>	<p>photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere The adaptations of leaves for photosynthesis. The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops The importance of plant reproduction through insect pollination in human food security How organisms affect, and are affected by, their environment, including the accumulation of toxic materials.</p>
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Key Question(s):	Working Scientifically opportunities:	Big Question - Assessment opportunity	Linked Texts		
<p>Why do we need to classify living things? How do we classify? What are the difficulties with classification? (penguins, whales, platypus) How do animals change over time? Why does variation exist? What happens if animals of different species breed? (hybrids) What happens to house plants outside? What are microorganisms? How can we prevent the spread of disease? Why do animals and plants compete - and what for?</p>	<p>Competitive tests - How does the temperature affect how much gas is produced by yeast? Which is the most common invertebrate on our school field?</p> <p>Identify and Classify - How would you make a classification key for vertebrates/invertebrates or microorganisms?</p> <p>Observation Overtime - What happens to a piece of bread if you leave it on the windowsill for two weeks?</p> <p>Pattern Seeking - Do all flowers have the same number of petals?</p> <p>Research - What do different types of</p>	<p>In what ways can we sort living things?</p>	<p>Beetle Boy (M G Leonard)</p> <p>Insect Soup (Barry Louis Polisar)</p> <p>Fur and Feathers (Janet Halfmann)</p>		



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	microorganisms do? Are they always harmful?				
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Term 3: Animals including Humans (Year 6)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
<p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p>Describe the ways in which nutrients and water are transported within animals, including humans.</p>	<p>The heart pumps blood around the body.</p> <p>Oxygen is breathed into the lungs where it is absorbed by the blood.</p> <p>Muscles need oxygen to release energy from food to do work.</p> <p>(Oxygen is taken into the blood in the lungs; the heart pumps the blood through blood vessels to the muscles; the muscles take oxygen and nutrients from the blood.)</p>	<p>Oxygenated, Deoxygenated, Valve, Exercise, Respiration</p> <p>Circulatory system, heart, lungs, blood vessels, blood, artery, vein, pulmonary, alveoli, capillary, digestive, transport, gas exchange, villi, nutrients, water, oxygen, alcohol, drugs, tobacco.</p>	<p>Justus von Liebig (Theories of Nutrition and Metabolism)</p> <p>Sir Richard Doll (Linking Smoking and Health Problems)</p> <p>Leonardo Da Vinci (Anatomy)</p>	<p>Year 5: Describe the changes as humans develop to old age.</p>	<p>KS3: The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.</p> <p>The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts). Calculations of energy requirements in a healthy daily diet. The consequences of imbalances in the diet, including obesity,</p>



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					starvation and deficiency diseases The structure and functions of the gas exchange system in humans, including adaptations to function The effects of recreational drugs (including substance misuse) on behaviour, health and life processes.
Key Question(s):	Working Scientifically opportunities:	Big Question - Assessment opportunity	Linked Texts		
<p>Why do we need oxygen? How do we breathe? Do fish and plants breathe? Do all living things need oxygen? How does the size of a person's lungs affect their lung capacity? Are there ways to increase/decrease our lung capacity? Is lung capacity fixed?</p>	<p>Competitive tests - How does the length of time we exercise for affect our heart rate? Can exercising regularly affect your lung capacity? Which type of exercise has the greatest effect on our heart rate?</p> <p>Identify and Classify - Which organs of the</p>	<p>How do our choices affect how our bodies work? Why does my heart beat?</p>	<p>Pig-Heart Boy (Malorie Blackman)</p> <p>Skellig (David Almond)</p> <p>A Heart Pumping Adventure (Heather Manley)</p>		



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<p>Why do we have blood? How does our heart work? How does size of muscle affect our pulse rate? How does exercise effect our pulse rate? How might the circulatory system of an elephant, a hummingbird, or a polar bear differ? Is the air you breathe out, the same as that you breathe in?</p>	<p>body make up the circulation system, and where are they found?</p> <p>Observation Overtime - How does my heart rate change over the day? How much exercise do I do in a week?</p> <p>Pattern Seeking - Is there a pattern between what we eat for breakfast and how fast we can run?</p> <p>Research - How have our ideas about disease and medicine changed over time?</p>				
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Term 4 and 5: Light (Year 6 Unit)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
<p>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</p>	<p>Animals see light sources when light travels from the source into their eyes.</p>	<p>Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque,</p>	<p>Thomas Young (Wave Theory of Light) Ibn al-Haytham (Alhazen)</p>	<p>Year 3: Recognise that they need light in order to see things and that</p>	<p>KS3: The similarities and differences between light waves and waves in matter.</p>



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<p>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. Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.</p>	<p>Animals see objects when light is reflected off that object and enters their eyes. Light reflects off all objects (unless they are black). Non shiny surfaces scatter the light so we don't see the beam. Light travels in straight lines.</p>	<p>shadow, block, transparent, translucent. Reflect Absorb Emitted Scattered Refraction</p>	<p>(Light and our Eyes) Percy Shaw (The Cats Eye)</p>	<p>dark is the absence of light. Notice that light is reflected from surfaces. Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Recognise that shadows are formed when the light from a light source is blocked by a solid object. Find patterns in the way that the sizes of shadows change.</p>	<p>Light waves travelling through a vacuum; speed of light. The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface Science. 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. Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. Colours and the different frequencies of light, white light and prisms (qualitative</p>
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Key Question(s):	Working Scientifically opportunities:	Big Question - Assessment opportunity	Linked Texts		
<p>How does the size of an object affect the size of a shadow?</p> <p>How does the distance between the light and the object change the size of a shadow?</p> <p>How does the distance between the object and the size of the screen affect the size of a shadow?</p> <p>How would a solar eclipse be different if:</p> <ul style="list-style-type: none"> - The moon was a different size? - The earth spin faster or slower? - The sun was larger or smaller? - If the earth and moon were the same size but further away in the solar system? 	<p>Competitive tests - How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface? Which material is most reflective?</p> <p>Identify and Classify - Can you identify all the colours of light that make white light when mixed together? What colours do you get if you mix different colours of light together?</p>	<p>Why does my shadow change length over the course of a day?</p>	<p>Letters from the Lighthouse (Emma Carroll)</p> <p>The Gruffalo's Child (Julia Donaldson)</p> <p>The King Who Banned the Dark (Emily Haworth-Booth)</p>		<p>only); differential colour effects in absorption and diffuse reflection.</p>



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<p>How does the amount of aluminium foil scrunched affect how much light is scatters? How does the amount of polishing affect how well a piece of metal scatters light? How perfect are our mirrors? Do some scatter light more than others? What happens to light when it is shone through water? How is this affected by putting glitter, salt or talc in the water? How does a periscope/microscope/telescope work?</p>	<p>Observation Overtime - Does the temperature of a light bulb go up the longer it is on? How does my shadow change over the day?</p> <p>Pattern Seeking - Is there a pattern to how bright it is in school over the day? And, if there is a pattern, is it the same in every classroom?</p> <p>Research - Why do some people need to wear glasses to see clearly? How do our eyes adapt to different conditions?</p>				
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Term 6: Electricity (Year 6 Unit)

National Curriculum Objectives	Key Knowledge	Vocabulary	Key Scientists	Prior Learning	Future Learning
Associate the brightness of a lamp or the volume of a buzzer with the	Batteries are a store of energy. This energy pushes electricity round	Electricity, neutrons, protons, electrons, nucleus, atom, electric	Alessandro Volta (Electrical Battery)	Year 4:	KS3: Electric current, measured in amperes, in



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<p>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.</p>	<p>the circuit. When the battery's energy is gone it stops pushing. Voltage measures the 'push.' The greater the current flowing through a device the harder it works. Current is how much electricity is flowing round a circuit. When current flows through wires heat is released. The greater the current, the more heat is released.</p>	<p>current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, conductor.</p>	<p>Nicola Tesla (Alternating Currents)</p>	<p>Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. 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. Recognise that a switch opens and closes the circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors. Know the difference between a conductor and</p>	<p>circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. Differences in resistance between conducting and insulating components (quantitative). Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects. The idea of electric field, forces acting across the space</p>
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<p>Do all batteries push as hard as each other? What is electricity? How does the voltage of a battery affect how much current is pushed? How does the length of time I leave the current flowing for affect the brightness of the bulb? How does number of bulbs affect the brightness of a bulb? Are all types of wires as good as conducting electricity? Why are wires insulated in plastic? Does type of material make a difference? Does length of wire make a difference?</p>	<p>Competitive tests - How does the voltage of the batteries in a circuit affect the brightness of the lamp? How does the voltage of the batteries in a circuit affect the volume of the buzzer? Which make of battery lasts the longest?</p> <p>Identify and Classify - How would you group electrical components and appliances based on what electricity makes them do?</p> <p>Observation Overtime - How does brightness of bulb change as the battery runs out? How</p>	<p>Can we vary the effects of electricity?</p>	<p>Goodnight Mister Tom (Michelle Magorian)</p> <p>Blackout (John Rocco)</p> <p>Hitler's Canary (Sandi Toksvig)</p>		



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<p>Does the type of circuit affect how the components work/long the battery lasts?</p> <p>What renewable ways can we generate electricity?</p> <p>How does current affect heat?</p> <p>What are the dangers of a short circuit?</p>	<p>can we measure how quickly a battery is used up?</p> <p>Pattern Seeking - Does the temperature of a light bulb go up the longer it is on?</p> <p>Research - How has our understanding of electricity changed over time?</p>				
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