

Year 5 and 6 - Science Programme of Study

Programme of study	Living things and their habitats	Evolution and inheritance	Properties and changes of materials	Light and shadows	Humans – Keeping healthy and diet
Coverage	Lifecycles (including plants)	Fossils and adaptation	Properties of materials; reversible and irreversible changes	Light, vision and shadows	Circulatory system and keeping healthy
Content	<p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> <p>Describe the life process of reproduction in some plants and animals.</p>	<p>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>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</p> <p>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</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</p> <p>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p> <p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated,</p>	<p>Recognise that light appears to travel in straight lines</p> <p>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</p> <p>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</p> <p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the</p>	<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>including through filtering, sieving and evaporating</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.</p>	<p>objects that cast them.</p>	
<p>Notes and guidance</p>	<p>Study and raise questions about their local environment</p>	<p>Build on learning about fossils (rocks, Y3), find out more about how living things</p>	<p>Exploring and comparing the properties of a broad range of materials, including</p>	<p>Build on learning (Y3), exploring the way that light behaves, including light sources,</p>	<p>Build on their learning about the main body parts and internal organs (Y3, Y4) (skeletal, muscular and digestive system) to explore and answer questions that help</p>

	<p>throughout the year.</p> <p>Observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. Find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.</p> <p>Find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.</p>	<p>on earth have changed over time.</p> <p>Be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, Labradors are crossed with poodles.</p> <p>Appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Find out about the work of palaeontologists such as Mary</p>	<p>relating these to what they learnt about magnetism (Y3) and electricity (Y4).</p> <p>Explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes.</p> <p>Explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda.</p> <p>Find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.</p>	<p>reflection and shadows.</p> <p>Talk about what happens and make predictions.</p>	<p>them to understand how the circulatory system enables the body to function.</p> <p>Learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body.</p>
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<p>Working Scientifically</p>	<ul style="list-style-type: none"> ♣ planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary ♣ taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate ♣ recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs ♣ using test results to make predictions to set up further comparative and fair tests ♣ 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 and other presentations ♣ identifying scientific evidence that has been used to support or refute ideas or arguments. 				
	<p>Observing and comparing the life cycles of plants and animals in their local environment</p>	<p>Observing and raising questions about local animals and how they are</p>	<p>Carrying out tests to answer questions, for example, 'Which materials would be</p>	<p>Deciding where to place rear-view mirrors on cars</p>	<p>Exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.</p>

	<p>with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences.</p> <p>Try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs.</p> <p>Observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow.</p>	<p>adapted to their environment</p> <p>Comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels.</p> <p>Analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.</p>	<p>the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?’</p> <p>Compare materials in order to make a switch in a circuit.</p> <p>Observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes.</p> <p>Research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.</p>	<p>Designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works.</p> <p>Investigate the relationship between light sources, objects and shadows by using shadow puppets.</p> <p>Extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (<i>they do not need to explain why these phenomena occur</i>).</p>	
<p>Identifying and Classifying</p>	<p>Regularly revisit KS1 skills: Focus on asking questions about the similarities and differences between things. Go outside to explore the world around them at all times of the year.</p> <p>Increased focus on measuring and using data to answer ‘big questions’.</p>				

	<p>Continue to build on their observational skills, becoming more independent in identifying, through the use of increasingly complex tools, as well as developing higher order skills in reasoning and justification when explaining how they have chosen to group things.</p> <p>Design simple tests to help them classify materials, as well as independently using a range of secondary sources to support them in identifying a range of living things.</p>				
	<p>Compare this collection of animals based on similarities and differences in their lifecycle.</p>	<p>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>Can you group these materials based on whether they are transparent or not?</p>	<p>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>Which organs of the body make up the circulatory system, and where are they found?</p>
<p>Comparative testing</p>	<p>Use an increasingly wide range of equipment to make measurements. Learn what it means to measure accurately and check for reliability. Learn to independently plan how to record and analyse the data, using tables, pictograms, and bar charts to compare the measurements they make. Use the bar charts to draw conclusions about what they have found out to be the answer to their 'big question' Evaluate the procedure they used and the quality of their data, suggesting ways they could improve their test.</p>				
		<p>What is the most common eye colour in our class?</p>	<p>Which type of sugar dissolves the fastest? Which shoe is the most slippy?</p>	<p>Which material is most reflective?</p>	<p>Which type of exercise has the greatest effect on our heart rate?</p>
<p>Fair tests</p>	<p>Plan their own tests to collect data. Through fair testing learn to understand the different types of variables:</p> <ul style="list-style-type: none"> the dependent variable that they will change in their test, 				

	<ul style="list-style-type: none"> the independent variable that they are going to measure so that they can find out how the dependent variable affects it, the control variables which the children will need to keep the same so that they don't affect their results. <p>Measure and record data that can then be displayed in a scatter graph or line graph. Use their data to draw conclusions that identify a causal relationship eg 'when you increase X, Y will always decrease'. Throughout KS2, become progressively more systematic in how they approach fair tests and increasingly independent. Written conclusions to become increasingly sophisticated, with more focus on scientific explanations. Focus on their skills in evaluating their scientific enquiries. Learn to critique not just their experimental methods but also their data by reflecting on reliability and accuracy.</p>				
	How does the level of salt affect how quickly brine shrimp hatch?		How does the temperature of tea affect how long it takes for a sugar cube to dissolve?	How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface?	How does the length of time we exercise for affect our heart rate? Can exercising regularly affect your lung capacity?
Pattern seeking	<p>Begin to think for themselves when deciding what they should measure and observe. Begin to make decisions about the most appropriate equipment to use to collect data. Begin to think even more about their planning, including identifying the variables that they cannot control and suggesting the potential impact those variables might have on the data they collect. Use a data logger to collect the most accurate data they can. Using data analysis techniques to spot patterns, including using tabulated data and a variety of charts and graphs. Use data and graphs to support their explanations when describing relationships. Use pattern seeking as a preliminary test; use their findings to form and justify their own predictions, then propose further investigations to test these predictions.</p>				
	Is there a relationship between a mammal's size and its gestation period?	Is there a pattern between the size and shape of a bird's beak and the food it will eat?	Do all stretchy materials stretch in the same way?	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?	Is there a pattern between what we eat for breakfast and how fast we can run?
Research	<p>Reading for information and note-taking. Learn to interpret the information they find and critically consider its relevance in answering their 'big questions'. Use a range of secondary sources, including books, websites, and video to find their information. Listen to presentations from experts and science professionals to get their information, or ask them questions in interviews and letters Find more data in their research and use this to help answer questions</p>				

	<p>Start to collect their own data through questionnaires and interviews.</p> <p>Begin to evaluate the quality of the information they have found and how well it has enabled them to draw conclusions and answer their 'big question'.</p>				
	<p>What are the differences between the life cycle of an insect and a mammal?</p>	<p>What happened when Charles Darwin visited the Galapagos islands? Why do some people need to wear glasses to see clearly?</p>	<p>What are microplastics and why are they harming the planet?</p>	<p>How do astronomers know what stars are made of?</p>	<p>How have our ideas about disease and medicine changed over time?</p>
Ideas over time	<p>Explore and talk about their own and other people's scientific ideas.</p> <p>Begin to recognise how scientific ideas change and develop over time.</p> <p>Use a range of secondary sources of information.</p> <p>Develop their use of scientific language.</p> <p>Explain ideas using their scientific knowledge and understanding.</p> <p>Evaluate the significance, strengths and weaknesses of different scientists' ideas.</p>				
	<p>How did the experiments and ideas of Jan Ingenhousz help improve our understanding of plants?</p>	<p>What ideas did American geneticist Barbara McClintock have about genes that won her a Nobel Prize?</p>	<p>What did Stephanie Kwolek discover and why was it important?</p>	<p>Cameras detect light – how has our understanding of light and its effects changed camera design throughout history?</p>	<p>What ideas did Edward Jenner have about small pox and how did he test them?</p>
Scientists to research	<p>David Attenborough (Naturalist and Nature Documentary Broadcaster)</p>	<p>Charles Darwin and Alfred Russel Wallace (Theory of Evolution by Natural Selection)</p>	<p>Spencer Silver, Arthur Fry and Alan Amron (Post-It Notes)</p>		<p>Justus von Liebig (Theories of Nutrition and Metabolism)</p>
	<p>James Brodie of Brodie (Reproduction of Plants by Spores)</p>	<p>Jane Goodall (Chimpanzees)</p>	<p>Ruth Benerito (Wrinkle-Free Cotton)</p>		<p>Sir Richard Doll (Linking Smoking and Health Problems)</p> <p>Leonardo Da Vinci (Anatomy)</p>

