Year 3 and 4 - Science Programme of Study

Programme of study	Rocks and soils	Forces and magnets	States of matter	Animals including humans	Plants
Coverage	Types of rocks, rock cycle, properties of rocks, soil make up, fossils	Movement, magnetism	Solid, liquid and gas, evaporation, condensation, (ir)reversible change, water cycle	Digestive system and teeth	Parts and functions of plants, requirements for plants to live, water in plants, life cycle of plants
Content	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties Describe in simple terms how fossils are formed when things that have lived are trapped within rock Recognise that soils are made from rocks and organic matter.	Compare how things move on different surfaces Notice that some forces need contact between two objects, but magnetic forces can act at a distance Observe how magnets attract or repel each other and attract some materials and not others Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials Describe magnets as having two poles	Compare and group materials together, according to whether they are solids, liquids or gases Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Describe the simple functions of the basic parts of the digestive system in humans Identify the different types of teeth in humans and their simple functions Construct and interpret a variety of food chains, identifying producers, predators and prey.	Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant Investigate the way in which water is transported within plants Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

		Predict whether two magnets will attract or repel each other, depending on which poles are facing.			
Notes and guidance	Linked with work in history, explore different archaeological Roman sites.	Observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). Explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe).	Explore a variety of everyday materials and develop simple descriptions of the states of matter *(solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container)*. Observe water as a solid, a liquid and a gas and note the changes to water when it is heated or cooled.	Be introduced to the main body parts associated with the digestive system, for example, mouth, tongue, teeth, oesophagus, stomach and small and large intestine and explore questions that help them to understand their special functions.	Be introduced to the relationship between structure and function: the idea that every part has a job to do. Explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction. *Note: Pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens.*
Working Scientifically	♣ 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.				
	Observing rocks, exploring how and why they might have changed over time Using a hand lens or microscope to help	Comparing how different things move and grouping them Raising questions and carrying out	Grouping and classifying a variety of different materials Exploring the effect of temperature on	Comparing the teeth of carnivores and herbivores, and suggesting reasons for differences	Comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser

	them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. Raise and answer questions about the way soils are formed.	tests to find out how far things move on different surfaces and gathering and recording data to find answers their questions Exploring the strengths of different magnets and finding a fair way to compare them Sorting materials into those that are magnetic and those that are not Looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another Identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets. *Eg building Stonehenge!*	substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). Research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. Observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.	Finding out what damages teeth and how to look after them. Draw and discuss their ideas about the digestive system and compare them with models or images.	Discovering how seeds are formed by observing the different stages of plant life cycles over a period of time Looking for patterns in the structure of fruits that relate to how the seeds are dispersed. Observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.

Identifying and Classifying	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. Increased focus on measuring and using data to answer 'big questions'. 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. 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.				
	Can you use the identification key to find out the name of each of the rocks in your collection?	Which materials are magnetic?	Can you group these materials and objects into solids, liquids, and gases?	What are the names for all the organs involved in the digestive system? How can we organise teeth into groups?	How many different ways can you sort our seed collection?
Comparative testing	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.				
	Which soil absorbs the most water?	Which magnet is strongest? Which surface is best to stop you slipping?	Does seawater evaporate quicker than fresh water?	In our class, are omnivores taller than vegetarians?	Which conditions can help seeds germinate faster?
Fair tests	Plan their own tests to collect data. Through fair testing learn to understand the different types of variables: • the dependent variable that they will change in their test,				

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<tr><td></td><td colspan="5">• 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.
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.</td></tr>
<tr><td></td><td>How does adding different amounts of sand to soil affect how quickly water drains through it?</td><td>How does the mass of an object affect how much force is needed to make it move?</td><td>How does the mass of a block of ice affect how long it takes to melt?

How does the surface area of a container of water affect how long it takes to evaporate?</td><td></td><td>How does the length of the carnation stem affect how long it takes for the food colouring to dye the petals?</td></tr>
<tr><td>Pattern seeking</td><td colspan="5">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.</td></tr>
<tr><td></td><td>Is there a pattern in where we find volcanos on planet Earth?</td><td>Does the size and shape of a magnet affect how strong it is?</td><td>Is there a pattern in how long it takes different sized ice lollies to melt?</td><td>Are foods that are high in energy always high in sugar?</td><td>What colour flowers do pollinating insects prefer?</td></tr>
<tr><td>Research</td><td colspan="5">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
Start to collect their own data through questionnaires and interviews.
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'.</td></tr>
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	Who was Mary Anning and what did she discover?	How have our ideas about forces changed over time? How does a compass work?	What are hurricanes, and why do they happen?	How do dentists fix broken teeth?	What are all the different ways that seeds disperse?
Ideas over time	Explore and talk about their own and other people's scientific ideas. Begin to recognise how scientific ideas change and develop over time. Use a range of secondary sources of information. Develop their use of scientific language. Explain ideas using their scientific knowledge and understanding. Evaluate the significance, strengths and weaknesses of different scientists' ideas.				
	What were James Hutton's ideas about how rocks were made and what was his evidence? How did Mary Anning's work help us to understand prehistoric life?	How have our ideas about magnets changed over time?	How have scientific tests for predicting the weather changed over time?	How has a visit to the dentist changed since ancient times?	
Scientists to research	Mary Anning (Discovery of Fossils) Inge Lehmann (Earth's Mantle)	William Gilbert (Theories on Magnetism) Andre Marie Ampere (Founder of Electro-Magnetism)	Anders Celcius (Celcius Temperature Scale) Daniel Fahrenheit (Fahrenheit Temperature Scale / Invention of the Thermometer)	Ivan Pavlov (Digestive System Mechanisms) Joseph Lister (Discovered Antiseptics)	Jan Ingenhousz (Photosynthesis) Joseph Banks (Botanist)