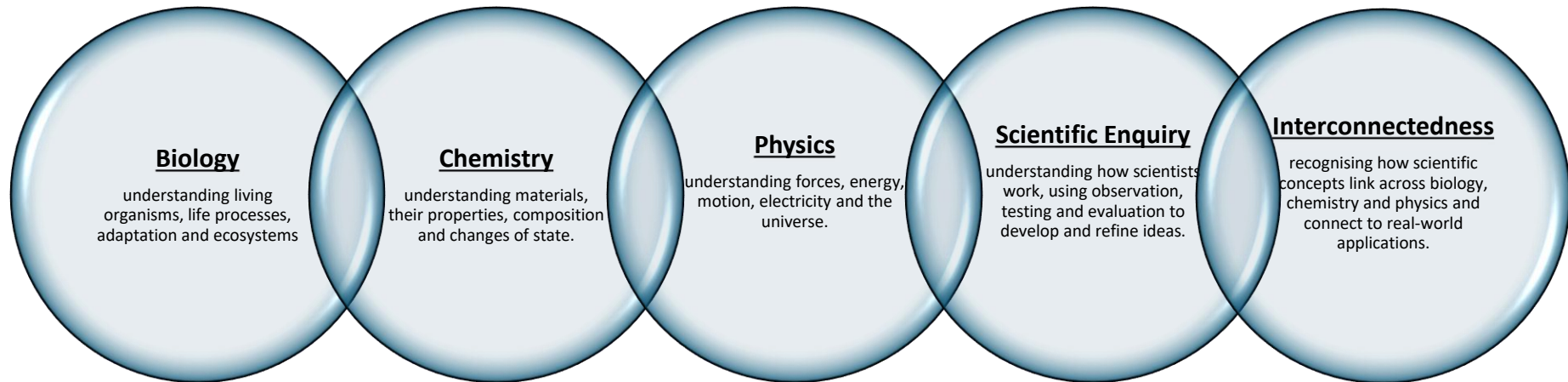




SCIENCE: Progression map

Substantive Concepts

At SPA, our Science curriculum provides pupils with a secure understanding of the key concepts and principles that underpin the study of the natural world. These substantive concepts act as the foundations for all scientific learning and allow pupils to make sense of their observations, ask meaningful questions and draw evidence-based conclusions.



Science: Disciplinary Knowledge (Working Scientifically)

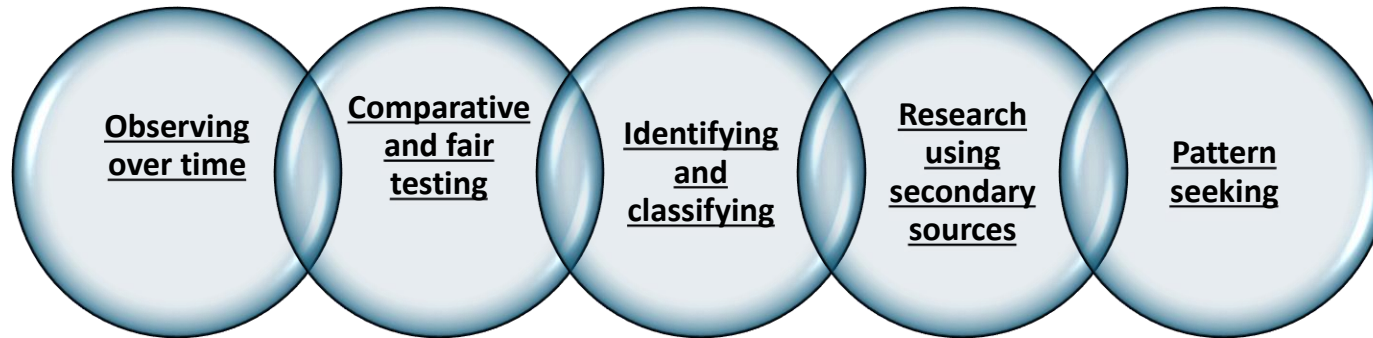
Disciplinary knowledge in Science refers to the understanding of how scientific knowledge is developed, tested and validated. Through practical enquiry, pupils learn how to ask questions, plan investigations, collect and analyse data, and evaluate the reliability of evidence. These skills enable pupils to think critically, make informed predictions and communicate their findings clearly.



SCIENCE: Progression map

Scientific Enquiry Types

Throughout Key Stage 2, pupils engage in a range of enquiry types to develop a secure understanding of how science works. These include:



Scientific Vocabulary and Language Development

Scientific vocabulary is taught explicitly and revisited frequently to ensure understanding and confident use in context. Each unit identifies key Tier 2 and Tier 3 vocabulary that pupils are expected to use accurately when explaining scientific concepts, planning investigations and communicating findings.

Teachers model precise scientific language and encourage children to articulate their thinking clearly, using correct terminology in discussions, written work and presentations. This supports pupils' ability to reason scientifically and apply knowledge across contexts.



SCIENCE: Progression map

	Year 3	Year 4	Year 5	Year 6
Scientific Enquiry	Ask simple scientific questions and begin to recognise different types of enquiry.	Ask relevant questions and use different types of scientific enquiry to answer them.	Plan enquiries, recognising and controlling variables where necessary.	Independently plan fair tests, identifying variables and controlling conditions with justification.
Observation & Measurement	Make systematic and careful observations using simple equipment.	Take increasingly accurate measurements using standard units and a range of equipment.	Take repeat readings to ensure reliability and record data precisely.	Select appropriate equipment and use it accurately, explaining precision and reliability.
Recording & Presenting Data	Use drawings, tables and simple charts to record findings.	Record data in bar charts and tables, using appropriate labels and scales.	Record and present data using line graphs, scatter graphs and scientific diagrams.	Select suitable methods for recording data, justifying choices and comparing representations.
Analysing & Interpreting Results	Describe what has been found out and begin to spot simple patterns.	Use results to draw conclusions and make predictions for new values.	Identify patterns, trends and relationships within data to draw justified conclusions.	Explain patterns and anomalies using scientific evidence and reasoning.
Evaluating & Reflecting	Discuss findings with support and identify something they could do differently.	Suggest improvements to an enquiry and identify potential errors.	Evaluate the degree of trust in results and suggest improvements to methods.	Critically evaluate reliability and validity of results, proposing refinements and future enquiries.



SCIENCE: Progression map

Biology Living Things and Habitats/ plants

Year 3
Plants

Prior knowledge	Children need to know/ be able to: <ul style="list-style-type: none"> ◦ identify and name a variety of common wild and garden plants, including deciduous and evergreen trees ◦ identify and describe the basic structure of a variety of common flowering plants, including trees ◦ identify and name a variety of plants and animals in their habitats, including microhabitats ◦ describe how animals obtain their food from plants and other animals, using the idea of a simple food chain ◦ describe how seeds and bulbs grow into mature plants ◦ that plants need water, light and a suitable temperature to grow and stay healthy 		
Vocabulary	Learning outcome	Knowledge	Working Scientifically
Seed Stem Leaf Roots Flower Pollination Reproduction Seed dispersal Pollen Xylem Nutrients Life cycle Prediction Variable	Identify the growth and survival needs of plants	Plants need air, water, light, nutrients and room to grow. That needs vary in different plants	To pose relative questions
	To describe the relationship between structure and function in plants.	Plants are made up of roots, a stem, leaf, fruit and flower. Each part has a different function.	To design a table to gather results.
	To investigate how water is transported in plants.	Roots absorb water and nutrients from the soil. Xylem are the vessels inside the stem that transport water to the rest of the plant.	To suggest what observations to make and how long to make them for. To decide on equipment that might be useful.
	To explore the role of flowers in the life cycle of a plant.	There are six stages to the life cycle of a plant. Flowers are the reproductive organ of a plant. Flowers attract bees for pollination.	To complete, read and interpret data in a bar chart.



SCIENCE: Progression map

	To apply knowledge of plant life and growth.	Plants grow poorly when deprived of water, light or air. Results are more trustworthy when variables are controlled better.	To identify and suggest changes to an enquiry.
	To explore seed dispersal methods.	Flowering plants disperse seeds so the lifecycle can continue. Seeds can be dispersed by the wind, by floating or by animals.	To use results to draw conclusions.
Sticky Knowledge (assessment questions)	Q What does a plant need to grow healthily? Water, air, light, nutrient		
	Q What is the job of a plant's stem? To transport water and support the leaves and flowers.		
	Q Which part of the plant absorbs water and minerals? Roots		
	Q What is the role of a flower? To attract insects		
	Q What is germination? A plant growing from a seed?		
	Q How do bees help plants? By pollinating flowers		
	Q What is a method of seed dispersal? Carrying in animal fur, transported by water, blown in the wind, carried by birds		
Y e a	Prior knowledge	Children need to know/ be able to:	



SCIENCE: Progression map

		<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 ◦ identify and name a variety of plants and animals in their habitats, including microhabitats ◦ how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Growth Nutrition Habitat	To group animals in various ways	<p>Living things can be grouped based on shared characteristics</p> <p>Vertebrates are animals with backbones and invertebrates are animals without a backbone.</p>	To record data in Carroll and Venn diagrams
	Vertebrates Invertebrates Reproduction Excretion Deforestation Pollution Conservation Classification	To recognise the difference between things that are alive, were once alive or have never been alive.	<p>For something to be alive, it must complete one of the life processes (movement, sensitivity, growth, reproduction, excretion, nutrition)</p> <p>If it used to be alive, it was once attached to part of a living thing.</p> <p>If something has never been alive, it does not complete any life processes and was never part of a living thing.</p>	To classify objects in to groups, giving reasons for choices.
	Observe	To make and use classification keys.	A classification key can be used to group and identify plants and animals.	<p>To observe and describe the characteristics of different organisms.</p> <p>To use a classification key to group, identify and name local living things.</p> <p>To draw a classification tree.</p>
		To recognise and describe different habitats and their inhabitants.	Different living things live in different types of habitats.	Gather, record, classify and present data.



SCIENCE: Progression map

		Some habitats change throughout the year and this can be dangerous for living things.	
	To recognise the impact humans can have on habitats.	Activity can change the environment (deforestation, conservation, farming, pollution) Humans can impact both positively and negatively on the environment.	Research using secondary sources.
	To recognise the impact of natural disasters on habitats.	Wild fires, earthquakes and floods affect habitats. To know some of the impacts of natural disasters on wild life.	Ask relevant questions
Sticky Knowledge (assessment questions)	Q Which group of animals has a backbone? Vertebrates		
	Q Name a type of invertebrate? Jellyfish, squid, bee, ant, worm		
	Q What type of key is used to classify living things? A classification key		
	Q What problems are caused by deforestation? Animals losing their homes Trees being cut down		
	Q Which vertebrate group has feathers? Birds		
	Q How might a conservationist restore a habitat? Planting trees Cleaning up pollution		



SCIENCE: Progression map

		Breeding animals and re-introducing them to that habitat		
Year 5 Life cycles and reproduction	Prior knowledge	Children need to know/ be able to: <ul style="list-style-type: none"> ◦ 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 ◦ identify that humans and some other animals have skeletons and muscles for support, protection and movement ◦ life cycle of flowering plants, including pollination, seed formation and seed, dispersal 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Life cycle Reproduction Mammal Amphibians Hatch Hatchlings	To describe the life cycle of a plant including the reproductive stage.	Sexual reproduction requires two parents, whereas asexual reproduction only requires one parent. Plants can either reproduce or clone.	Through dissection observe and compare equivalent parts of different flowers.
	Gestation Adolescent Juvenile Fledglings Embryos Asexual reproduction Clone Predict Observe Compare	To describe the life cycle of a mammal	To know the lifecycle of a mammal (gestation stage, birth and newborn, infant stage, juvenile stage, adolescent stage, adult stage, mating stage) To know that mammal have fur or hair, are warm blooded, have a backbone, breath with lungs, give birth to live young and produce milk.	Research using secondary sources.
	To describe the life cycle of a bird. To compare the life cycle of a bird with that of a mammal.	The bird lifecycle (incubation stage, hatchling stage, nestling stage, fledgling stage, juvenile stage and adult stage) Birds develop in an egg, mammals develop inside the female. Fledglings and young mammals both require parental care to survive.	To be able to ask questions. To use secondary sources to answer questions.	



SCIENCE: Progression map

		To describe the lifecycle of an amphibian.	Amphibious embryos can detect threats. Eggs may hatch early due to threats within the environment.	To analyse data and draw conclusions.
		To describe the lifecycle of an insect. To compare the lifecycle of an insect with that of an amphibian.	There are three stages to an insects life cycle Egg cluster size is dependent upon the size of the leaf.	To use data to make predictions.
		To describe asexual reproduction in plants.	Asexual reproduction can occur through tubers, runners, cutting or budding.	To represent findings from data on a line graph.
		To describe the life cycle of a plant including the reproductive stage.	Sexual reproduction requires two parents, whereas asexual reproduction only requires one parent. Plants can either reproduce or clone.	Through dissection observe and compare equivalent parts of different flowers.
	Sticky Knowledge (assessment questions)	Q What is the female part of a flower called? Pistil Q What are the methods of asexual reproduction in plants? Tubers, runners, buds (cutting) Q What is the first stage in a mammal's life? Gestation Q What word describes changing from larval stage to an adult? Metamorphosis		
Year 6 Class	Prior knowledge	Children need to know/ be able to: <ul style="list-style-type: none"> ◦ animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food 		



SCIENCE: Progression map

		<ul style="list-style-type: none"> construct and interpret a variety of food chains, identifying producers, predators and prey. 		
Vocabulary	Learning outcome	Knowledge	Working Scientifically	
Classification key Organism Vertebrate Invertebrate Mammal Reptiles Micro-organism Binomial system Linnaean system Marsupial Placental mammal Egg-laying monotreme Bacteria Classify	To explain how organisms are classified using the Linnaean system.	The Linnaeus system groups species by kingdom, phylum, class, order, family, genus and species.	To organise a diagram to show the Linnaean system.	
	To classify the cold-blooded vertebrate groups using their common characteristics.	The animal kingdom is divided into two smaller groups: vertebrates and invertebrates. Vertebrates are animals with a backbone. Invertebrates are animals that do not have backbones.	To use a branching key to identify cold-blooded vertebrates	
	To classify the warm-blooded vertebrate groups using their common characteristics.	Mammals are warm blooded and breathe using lungs and they mostly have fur. Birds lay eggs, breathe with lungs and have feathers.	Use a classification key to classify vertebrates	
	To classify invertebrates using their characteristics.	Invertebrates can be divided into smaller groups: worms, snails, spiders and insects.	Use a classification key to classify invertebrates.	
	To describe how the plant kingdom is organised (based on shared characteristics)	The plant kingdom can be subdivided into a number of different groups: mosses, ferns, conifers, flowering plants.	Produce a working classification key.	
	To describe and classify micro-organisms.	Micro-organisms (also known as microbes) are mostly unicellular and are too small to be seen with the naked eye. Micro-organisms include organisms such as bacteria, protists (e.g. algae) and some fungi.	Use a classification key to classify bacteria.	



SCIENCE: Progression map

Year 6 Evolution and Inheritance	Sticky Knowledge (assessment questions)	<p>Q Which vertebrate group usually gives birth to living young? Mammals</p> <p>Q Which cold-blooded invertebrate does not have scales? Amphibians</p> <p>Q Which invertebrates have exoskeletons? Beetles, snails, crabs, spiders</p> <p>Q Which plants reproduce with spores? Ferns and mosses</p> <p>Q What is a micro-organism? A living thing that is so small it can only be seen through a microscope</p>		
	Prior knowledge	Children need to know/ be able to: <ul style="list-style-type: none"> ◦ 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 ◦ describe the changes as humans develop to old age. ◦ recognise that environments can change and that this can sometimes pose dangers to living things. 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Environment Adaptation	To explain why there are differences within species	Living things have changed over time.	To group factors



SCIENCE: Progression map

<p>Fossil Variable</p> <p>Variation Extinct Inherit Natural selection Control variable</p> <p>Evaluate Evidence Explain</p>	<p>To recognise the inheritance of characteristics in plants and animals</p>	<p>Characteristics are passed from parents to their offspring, but all offspring vary from their parents.</p>	<p>To describe patterns of inheritance</p>
	<p>To explain why adaptation is necessary</p>	<p>Over time, variation in offspring can affect animals' chances of survival in particular environments.</p>	
	<p>To model how natural selection affects population size</p>	<p>Living things better suited to their habitat are more likely to survive and reproduce, resulting in offspring more likely to inherit those characteristics.</p>	<p>Evaluate the degree of trust and pose new questions for further enquiry</p>
	<p>To describe the theory of evolution</p>	<p>Animals and plants have adapted to suit their environment of many millions of years and this process can be called evolution.</p>	<p>Consider evidence used to inform theories</p>
	<p>To recognise evidence that can be used for evolution</p>	<p>Fossils provide information about living things that inhabited the Earth many years ago.</p>	<p>Consider the degree of trust in the evidence used.</p>
<p>Sticky Knowledge (assessment questions)</p>	<p>Q What is variation? Differences between individuals of a species</p> <p>Q What is an example of environmental variation? A scar</p> <p>Q What is an example of inherited variation? Blood type, eye colour, hair colour</p> <p>Q What is an example of an adaptation? Camel – fatty hump, long eye lashes, large feet</p> <p>Q What are the steps for natural selection? Variation - - Advantages inherited - - survival of the fittest - - change /adaptation</p>		



SCIENCE: Progression map

Biology Animals including Humans				
Year 3 Movement and Nutrition	Prior knowledge	Children need to know/ be able to: <ul style="list-style-type: none"> ◦ identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense ◦ know that animals, including humans, have offspring which grow into adults ◦ describe the basic needs of animals, including humans, for survival (water, food and air) ◦ the importance for humans of exercise, eating the right amounts of different types of food, and hygiene 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Movement Bone Balanced diet Vertebrate Invertebrate Mineral Nutrient Joint Protection	To explain the role of a skeleton.	The skeleton in humans and some animals is used for movement, protection and support. Animals can be grouped based on the presence of a skeleton	Group animals based on their physical properties.
		To recognise the main bones in the body	The name and location of the main bones in the body: skull, spine, ribs and pelvis.	Measure and sort data.
		To explain how muscles are used for movement.	The muscular system in humans and some animals works with the skeleton for movement.	Explore scientific advances
	Explain Compare Conclusion Record	To explain how food is an essential energy source for animals.	Animals, including humans need the right types and amount of nutrition. Humans cannot make their own food; therefore they eat to get the nutrition needed.	Gather and compare data to answer questions.
	To identify the main nutrient groups and their simplest functions.	There are nutrient groups (carbohydrates, protein, fats, fibre, vitamins, minerals and water) with their own functions in the body.	Record information using secondary sources	



SCIENCE: Progression map

		To explain what makes a balanced diet.	A balanced diet should include all nutrient groups. Animals have different diets.	Explore how knowledge has progressed over time and how different jobs use this information.
	Sticky Knowledge (assessment questions)	<p>Q Can you name a joint on the human body? Elbow, knee, wrist, ankle</p> <p>Q What are the key functions (jobs) of a skeleton? Protect, support, movement</p> <p>Q How do muscles work? They attach to our bones and contract / relax (stretch/push/pull)</p> <p>Q What bones protect the heart? Ribs</p> <p>Q Which nutrient group keeps us warm and stores energy? Fats and oils</p> <p>Q Which foods contain fibre? Beans, carrots, nuts, oats</p>		
Year 4 Digestion and Food	Prior knowledge	Children need to know/ be able to: ◦ describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Mouth Saliva Stomach Herbivore Carnivore	To describe the function of the human digestive system.	The main organs of the human digestive system are the mouth, teeth, tongue, oesophagus, stomach, small and large intestines and each has a different function.	To evaluate a model



SCIENCE: Progression map

<p>Canine Molar Incisor Digest Faeces Producer</p> <p>Plan Group Explain Observe</p>	<p>To recognise the different types of human teeth and their role in eating.</p>	<p>The different types of human teeth are incisors, canines, premolars and molars and each has a different function.</p>	<p>To describe real observation methods and evidence collected.</p>
	<p>To explain how to care for our teeth.</p>	<p>Teeth can be damaged by sugary and acidic food, for example.</p> <p>It is important to brush teeth twice a day, make good food choices and visit the dentist regularly.</p>	<p>To plan an enquiry by considering which variables should be changed, measured and controlled.</p>
	<p>To recognise that differences in teeth relate to an animals diet.</p>	<p>The teeth of herbivores and carnivores are different because of their different diets.</p>	<p>To group animals based on their diet.</p>
	<p>To recognise producers, predators and prey in food chains.</p>	<p>Predators hunt for their food and prey are the animals being hunted.</p> <p>Producers make their own food.</p> <p>Food chains begin with a producer, followed by consumers and arrows to show the energy passed on.</p>	<p>To analyse patterns and form conclusions using scientific knowledge.</p>
	<p>To recognise that animal poo can give us clues about digestion, teeth and diet.</p>	<p>Studying an animals poo can give clues about its habitat, diet and health.</p> <p>Such experts, use this evidence in their studies of animals.</p>	<p>To construct a results table for recording observations.</p>
<p>Sticky Knowledge (assessment questions)</p>	<p>Q Name the parts of the digestive system Mouth - - Oesophagus - - stomach - - large intestine - - small intestine</p> <p>Q Which part of the digestive system absorbs nutrients into the blood? Small intestine</p> <p>Q Can you name 4 different types of teeth? Molar, canine, incisor, pre-molar</p>		



SCIENCE: Progression map

		<p>Q Which teeth are good for grinding and crushing food? Molar</p> <p>Q What is a carnivore? A living thing that eats mostly meat.</p> <p>Q What are the elements of a food chain? Producers and consumers. Prey and predators.</p>		
Year 5 Human timeline	Prior knowledge	Children need to know/ be able to: <ul style="list-style-type: none"> ◦ notice that animals, including humans, have offspring which grow into adults ◦ that humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat ◦ identify that humans have skeletons and muscles for support, protection and movement 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Life-cycle Male Female Mammal Foetus Gestation period Hormones Period (menstruation) Puberty	To describe how humans change from babies through to old age. To identify changes in males and females as a result of puberty.	The human life-cycle consists of baby, toddler, child, teenager, adult and elderly. It is considered normal for puberty to begin anytime between the ages of 8-13 for girls and 9-14 in boys. Changes that occur during puberty include growing taller, changes in mood, pubic hair grows, breasts develop and period starts in girls, the penis and testicles grow in boys.	To use a line graph to identify patterns in height and predict values.
	Explore Predict Describe Compare	To explore the gestation periods of humans and other animals.	Gestation periods varies across mammals. As a general rule - the larger the mammal, the longer the gestation period.	To plot data on a scatter graph.



SCIENCE: Progression map

	Sticky Knowledge (assessment questions)	<p>Q What are the 6 stages of a human life cycle? Baby – toddler – child – teenager – adult –elderly</p> <p>Q Name a change that happens in puberty for females. Hair growth, acne, periods, sweating, breasts</p> <p>Q Name a change that happens in puberty for males. Hair growth, change in voice, sweating, testicles grow, acne</p>		
Year 6 Circulation and Health	Prior knowledge	Children need to know / be able to: <ul style="list-style-type: none"> ◦ importance for humans of exercise, eating the right amounts of different types of food, and hygiene ◦ identify that humans and some other animals have skeletons and muscles for support, protection and movement ◦ describe the simple functions of the basic parts of the digestive system in humans 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Heart Blood Oxygen Blood vessels Pulse Carbon dioxide Heart rate Nutrient Identify	To identify factors that affect our health and how to reduce their negative impact. To summarise the key structures and purpose of the circulatory system.	Diet, exercise, drugs and lifestyle can all affect our health. Having a healthy diet and lifestyle can improve our health. The main parts of the human circulatory system are the heart, blood vessels and blood. The heart pumps blood around the body.	To evaluate sources of information.



SCIENCE: Progression map

	Summarise		Blood vessels transport blood around the body.	
	Explain	To identify the key roles of blood.	<p>Blood transports vital substances around the body, including oxygen and nutrients.</p> <p>Blood has four main components: plasma, red blood cells, white blood cells and platelets.</p> <p>Blood also transports waste products to where they will be removed, such as carbon dioxide to the lungs or urea to the kidneys.</p>	To evaluate a model
	Evaluate	To explore the relationship between animal size and heart rate.	<p>Heart rate is the number of beats per minute, measuring in beats per minute (bpm)</p> <p>Generally, the larger the animal, the slower its heart rate and the smaller the animal, the faster its heart rate.</p>	To interpret patterns in data.
		To investigate the relationship between exercise and heart rate	<p>During exercise, the muscles need more oxygen and glucose to release the extra energy to move more, so the heart and breathing rates increase.</p> <p>Heart rate can be measured in different ways including, finding a pulse point, smart watches and pulsometers.</p>	To write a method
		To describe the relationship between heart rate and fitness.	<p>The resting heart rate is lower for people who are much fitter, such as athletes.</p> <p>The heart muscle can be trained to be more efficient, require fewer beats per</p>	To draw a line graph



SCIENCE: Progression map

			minute to pump the same amount of blood.	
	Sticky Knowledge (assessment questions)	<p>Q What is the function (job) of the heart? To pump blood around the body</p> <p>Q What do blood vessels do? Transport / carry blood around the body</p> <p>Q What lifestyle choices can have a positive effect in your health / heart? Regular exercise, healthy diet, drinking lots of water</p> <p>Q What is blood made up from? (4 main components) plasma, red blood cells, white blood cells and platelets</p> <p>Q Why does heart rate increase during exercise? Because the muscles need more oxygen and glucose</p>		
Year 3 Forces and Magnets	Physics Forces, Earth and Space			
	Prior knowledge	Children need to know/ be able to: <i>New unit of learning for Key Stage 2</i>		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
Attract Repel Magnetic Rough	To describe the effects of contact forces.	There are two groups of forces: contact forces such as friction and non-contact forces such as magnetism.	To label a diagram using arrows and scientific vocabulary	



SCIENCE: Progression map

<p>Smooth</p> <p>Force Contact force Non-contact force Magnetism Friction</p> <p>Describe Conclusion Investigate Interpret</p>		To visually represent a force, arrows can be used to indicate the direction a force is acting in.	
	To recognise the effects and uses of forces	<p>Rougher surfaces cause more friction than smoother surfaces.</p> <p>Friction opposes motion and can slow down or stop an object.</p>	Write a scientific conclusion identifying cause and effect.
	To interpret how and why things move differently and on different surfaces.	<p>Any variable that can affect the result must be controlled to make the test fair.</p> <p>Repeating measurements will make the data more reliable.</p> <p>The rougher the surface, the more friction there is. This means the rougher the surface the quicker the object slows down.</p>	Plan an investigation using variables.
	To describe the effects of magnets	<p>Magnets have a north and south pole. Opposite poles attract one another and like poles repel (push away).</p> <p>Magnetic materials include iron, nickel, cobalt and some rare earth metals.</p> <p>Magnetic materials contain at least one of these metals.</p>	Write a method.
	To compare the properties of different types of magnets.	<p>The strength of a magnet can vary dependent on shape, size, magnetic material and other factors.</p> <p>Examples of magnets can include bar, horseshoe, button and ring.</p>	To display data using a bar chart.



SCIENCE: Progression map

		To explain the uses of magnets	Magnets have many uses including compasses, toys, jewellery, speakers, motors, MRIs, Maglev trains and cranes.	To research the uses of magnets.
	Sticky Knowledge (assessment questions)	<p>Q Give an example of a non-contact force. Magnetism</p> <p>Q Give an example of a contact force. Friction</p> <p>Q What does friction do to a moving object? Slows it down or stops it moving</p> <p>Q Where are magnets used in everyday objects? Compass, toys, motors, jewellery</p> <p>Q What will happen if you put two south poles of magnets facing each other? They will repel</p>		
Year 5 Earth and Space	Prior knowledge	Children need to know/ be able to: <i>New unit of learning for Key Stage 2</i>		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Planet Moon Earth Star	To compare the contributions of Ptolemy, Alhazen and Copernicus to models of the Solar System.	The sun is a star at the centre of our solar system. The Earth and other planets orbit the Sun.	To pose testable questions about the solar system.
Solar system Phase Orbit	To describe the movement and shapes of the celestial bodies in our Solar System.	The Sun, Earth and Moon are approximate spherical bodies.	To develop a model to represent the Solar System.	



SCIENCE: Progression map

<p>Celestial body Hemesphere</p> <p>Explain Design Compare Represent</p>		<p>The planets in order of distance from the Sun are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.</p> <p>Gravity is a force that keeps the planets, their moons and asteroids in orbit.</p>	
	To describe the movement of the Moon relative to the Earth	<p>The moon is a celestial body that orbits a planet.</p> <p>The Moon orbits around the Earth. Some other planets also have a moon or moons.</p> <p>The Earth's Moon takes approximately 28 days (a lunar month) to orbit the Earth and how much of the Moon is visible from Earth changes as it orbits.</p>	To design and draw a table
	To explain the causes of day and night and the seasons.	<p>The rotation of the Earth causes day and night and the apparent movement of the Sun across the sky.</p> <p>The tilt of the Earth on its axis and its orbit around the Sun causes the seasons.</p>	Draw a diagram to explain day and night.
	To devise a sundial to tell the time	<p>Sundials are ancient devices used to tell the time using position of the Sun.</p> <p>Sundials must be aligned with true north (in the Northern Hemisphere) to give an accurate time.</p>	Calibrate and use a sundial to measure time.
	To describe some uses of satellites and the problems posed by space junk	<p>A natural satellite is a natural object in space that orbits a planet, like a moon.</p>	To use temperature data to make predictions about climate change.



SCIENCE: Progression map

			<p>An artificial satellite is a human-made object in space that orbits a planet.</p> <p>Some satellites gather data on climate change and scientists use this information to make predictions about climate change.</p>	
	<p>Sticky Knowledge <i>(assessment questions)</i></p>	<p>Q Which planet is closest to the sun? Mercury</p> <p>Q What causes day and night? The rotation of earth on its axis</p> <p>Q When the Northern Hemisphere tilts towards the Sun what season is it? Summer</p> <p>Q Which season has the shortest daylight hours? Winter</p> <p>Q How long does it take the Earth to orbit the sun? 36.25 days</p> <p>Q How many days does it take the moon to orbit earth? Approx 2 days</p>		
<p>Year 5 Unbalanced forces</p>	<p>Prior knowledge</p>	<p>Children need to know/ be able to:</p> <ul style="list-style-type: none"> ◦ compare how things move on different surfaces ◦ identify that some forces need contact between two objects 		
	<p>Vocabulary</p>	<p>Learning outcome</p>	<p>Knowledge</p>	<p>Working Scientifically</p>



SCIENCE: Progression map

<p>Force Gravity Friction Non-contact force</p> <p>Air resistance Water resistance Imbalanced Lever Pulley Gear</p> <p>Reliable Control variable Line of best fit Variable Anomaly</p>	<p>To describe gravity and its effects.</p>	<p>Gravity is a non-contact force that pulls objects together.</p> <p>Unsupported objects fall towards Earth because of gravity.</p>	<p>To analyse data to write a conclusion</p>
	<p>To describe air resistance and its effects.</p>	<p>Air resistance is a type of friction.</p> <p>Air resistance acts in the opposite direction to a moving object.</p> <p>The larger the surface area of an object, the greater air resistance it creates.</p>	<p>To plan a fair test to investigate air resistance</p>
	<p>To describe water resistance and its effects</p>	<p>Water resistance is a type of friction.</p> <p>Water resistance acts in the opposite direction to a moving object.</p> <p>The larger the surface area of an object the greater water resistance it creates.</p>	<p>To design a results table.</p>
	<p>To describe friction and its effects</p>	<p>When forces are imbalanced, the speed, shape or direction of an object changes.</p> <p>When forces are balanced the speed, shape or direction of an object stays the same.</p> <p>Rougher surfaces have more friction between them than smoother surfaces and that affects movement.</p>	<p>To evaluate a method</p>



SCIENCE: Progression map

	<p>To describe the effects of levers, pulleys and simple machines on movement.</p>	<p>Lever, pulleys and gears allow a smaller force to have a greater effect.</p> <p>Lever and pulleys make it easier to lift heavy things.</p> <p>Gears transmit power from one part of a machine to another, changing speed and direction of movement.</p>	<p>To draw and label a diagram</p>
	<p>To describe the relationship between lever length and effort</p>	<p>The longer the effort arm of a lever, the less effort is required to move the load.</p> <p>Lever can be used for lifting, opening and cutting.</p> <p>Lever require a load, a force and a pivot.</p>	<p>To draw an accurate line graph.</p>
<p>Sticky Knowledge <i>(assessment questions)</i></p>	<p>Q Give an example of a force which is a type of friction Air resistance, water resistance</p> <p>Q What factors affect gravity? Mass (weight) and distance</p> <p>Q What happens when forces are imbalanced? The speed, shape or direction of an object changes.</p> <p>Q What can be used to give a smaller force greater effect? Gears, pulleys, levers</p>		



SCIENCE: Progression map

Year 3 Light and Shadows	Physics Energy			
	Prior knowledge	Children need to know/ be able to: <i>New unit of learning for Key Stage 2</i>		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Reflection Shadow Reflective Luminous Non-luminous Cast (a shadow) (shiny)	To explain the role of light sources.	Light travels from a light source (e.g. Sun, bulbs and torches) Light is needed to see things and dark is the absence of light. Light from the sun can be dangerous and we should protect our eyes from it.	To plan and draw a results table



SCIENCE: Progression map

<p>Light source Transparent Translucent Opaque</p> <p>Predict Variable Measure Observe Pattern Record</p>	<p>To compare light reflecting on different surfaces.</p>	<p>When an object is shiny or reflective, it has a smooth surface for the light to bounce off and reflect more. Matt or rough materials reflect less light.</p> <p>An uneven surface provides a less accurate reflection.</p>	
	<p>To recognise which materials cast a shadow</p>	<p>A shadow is formed when the light from a light source is blocked by an object.</p> <p>Opaque materials create the darkest shadow because most of the light is blocked.</p> <p>Translucent materials create a lighter shadow because only some of the light is blocked.</p>	<p>To ask testable questions and plan how to answer them</p>
	<p>To summarise how shadows change throughout the day.</p>	<p>If the light source is the sun, the direction of a shadow will change throughout the day as a shadow is cast on the opposite side of an object.</p> <p>If the light source is the sun, the length of a shadow will change throughout the day. The higher the sun, the shorter the shadow.</p>	<p>To evaluate a method</p>
	<p>To investigate how the distance of the light source affects the size of its shadow.</p>	<p>The shorter the distance between the light source and the object, the bigger the shadow. This is because more light is being blocked.</p>	<p>To find patterns in data and form conclusions</p>



SCIENCE: Progression map

		The greater the distance between the light source and the object, the smaller the shadow.	
	To tell a story using shadow puppets	<p>The position of the shadow puppet will affect how the shadow appears on the screen.</p> <p>The closer the object to the light source, the larger the shadow.</p> <p>Using multiple objects can create different shapes.</p>	To recall how different people work with light and shadows.
	Sticky Knowledge <i>(assessment questions)</i>	Q What is a light source? Something which gives out light (e.g. sun, torch)	
		Q What happens to light when it reflects off a surface? It bounces off	
		Q What is an opaque material? Something which does not allow light to pass through (e.g. wooden door, stone wall)	
		Q What is the difference between translucent and transparent? Translucent allows some light to pass through, transparent allows most light through	
		Q When a light source moves towards an object what happens to its shadow? It gets bigger	
		Q Compared to the morning, what will a shadow look like at midday? It will be shorter	



SCIENCE: Progression map

Year 4 Electricity and Circuits	Prior knowledge	Children need to know/ be able to: <i>New unit of learning for Key stage 2</i>		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Circuit Electrical conductor Electrical insulator Battery/cell Power source Electricity Component Predict Explain Investigate	To recognise how electrical appliances are powered	Electrical appliances need a power source, including batteries or mains electricity. We can tell if something is an electrical appliance by the presence of a plug or battery compartment.	To recognise how electrical appliances are powered
		To construct an electrical circuit	All circuits must have a power supply, form a complete loop and include at least one device. An electrical circuit needs a complete path for the electric charge to flow through. You must keep away from water and have dry hands when working with electricity.	To construct an electrical circuit
		To explain the use of switches in a circuit	An open switch breaks a series circuit so the component will be off. A closed switch completes a series circuit so the components will be on. Switches are useful as they can help prevent electricity being wasted and keep us safe.	To explain the use of switches in a circuit
To explain the use of materials as electrical conductors or insulators		Electrical conductors (such as metals) allow electric charge to pass through	To explain the use of materials as electrical conductors or insulators	



SCIENCE: Progression map

		<p>them easily and these are known as electrical conductors.</p> <p>Some materials (such as wood and plastic) do not allow electric charge to pass through and these are known as electrical insulators.</p> <p>Metals are used for cables and wires because they are good conductors of electricity and plastic is used to cover cables and wires because it is a good insulator.</p>	
	To investigate what affects bulb brightness	<p>The more bulbs there are within a circuit, the dimmer they will be.</p> <p>The brightness changes because the more devices there are in a circuit, the less energy is transferred to the bulb per second.</p>	To investigate what affects bulb brightness
	To explain how to be safe around electricity	<p>Common electrical hazards include exposed wires, frayed cords, water near electrical appliances and misusing electrical outlets.</p> <p>Do not touch electrical appliances or switches with wet hands.</p> <p>Do not overload electrical sockets or put anything in them other than a plug.</p> <p>Tell an adult if you notice an electrical appliance or wire that seems damaged.</p>	To explain how to be safe around electricity



SCIENCE: Progression map

			In the event of an electrical fire, do not use water and call 999.	
	Sticky Knowledge (assessment questions)	<p>Q Give an example of a power source. Battery, mains</p> <p>Q What is a n electrical conductor? Something which allows a electrical current to pass through.</p> <p>Q Name good electrical conductors. Things made form metal</p> <p>Q What happens of you add more bulbs to a circuit? The bulbs get dimmer</p> <p>Q Give an example of an electrical insulator. Wood, paper, plastic</p> <p>Q Provide examples of circuits and ask children to identify: battery, bulb, switch, buzzer. Can they complete the circuit when there is an open switch?</p>		
Year 4 Sound and vibrations	Prior knowledge	Children need to know/ be able to: <i>New unit of learning for Key Stage 2</i>		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Sound Volume Vibration Particle Sound wave Insulating material Eardrum	To describe how sounds are made	Sound is a result of vibrations, which are fast back-and-forth movements. When something vibrates, like a guitar string or drum skin, it moves the air around it, which creates a sound wave. Sounds can be seen, heard and felt.	To observe closely how different instruments create a sound



SCIENCE: Progression map

	Pitch	To describe how sounds are heard through different mediums	<p>Sounds can travel through different mediums (liquids, solids and gases) to the ear.</p> <p>Sounds travels faster through mediums with more closely packed matter because it is easier to pass on the vibrations from one particle to another.</p> <p>Dolphins and whales use sound to communicate underwater.</p>	To research how whales and dolphins communicate underwater
	Observe Predict Research Variable	To describe the relationship between vibration, strength and volume	<p>A louder sound is created by a bigger vibration, which creates a bigger sound wave.</p> <p>A quieter sound is created by a smaller vibration, which creates a smaller sound wave.</p> <p>Volume is measured in a unit called decibels (dB).</p>	To present results using a bar chart
		To describe the relationship between volume and distance	<p>A sound gets fainter as the distance from the sound increases.</p> <p>This is because sound waves spread out in all directions through the air; the further away the sound, the less of them reach the ear.</p>	To suggest which variables to measure and for how long.
		To describe pitch and how to change it	<p>Quicker vibrations cause higher-pitched sounds and slower vibrations cause lower-pitched sounds.</p>	To design a simple results table



SCIENCE: Progression map

		<p>Pitch is how high or low a sound is and is measured in hertz.</p> <p>Pitch can be made higher or lower by changing size, volume or thickness.</p>	
	To explain how insulating materials can be used to muffle sound	<p>An insulating material reduces the amount of vibrations that pass through it and can be used to sound-proof a room or protect ears from noises.</p> <p>Softer materials or materials with air pockets or trapped air are good insulators.</p> <p>Jobs where people are exposed to sounds over 75 dB require them to wear ear protectors to prevent hearing damage.</p>	To identify when results or observations do not match predictions.
	Sticky Knowledge <i>(assessment questions)</i>	<p>Q What causes sound? Vibrations</p>	
		<p>Q What is volume? How quiet or loud a sound is</p>	
		<p>Q What causes a sound to get louder? Stronger vibrations</p>	
		<p>Q What happens as the distance from a sound source increases? The sound becomes quieter (volume decreases)</p>	
		<p>Q What unit of measure is used to measure the pitch of a sound? Hertz Hz</p>	
		<p>Q What unit of measure is used to measure the volume of a sound?</p>	



SCIENCE: Progression map

		Decibels (dB)		
Year 6 Light and reflection	Prior knowledge	Children need to know/ be able to: <ul style="list-style-type: none"> ◦ they need light in order to see things and that dark is the absence of light. ◦ identify that light is reflected from surfaces. ◦ understand that light from the sun can be dangerous and that there are ways to protect their eyes. ◦ understand that shadows are formed when the light from a light source is blocked by a solid object. 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Reflective Light source Shadow Pupil	To describe the pathway of light	Light cannot bend around an object. Light travels in a straight line from a light source.	To use evidence to form conclusions
	Luminous Non-luminous Periscope Light ray Incident-ray Ray diagram Units	To describe how we see	Luminous objects are seen as a result of light directly entering the eye. Light from a light source must reflect off the surface of an object and into our eyes to allow us to see a non-luminous object. Shiny objects reflect light more uniformly than non-shiny objects.	To draw scientific diagrams
Explain Fair test Line of best fit Reliable Conclude Scale	To explain how shadows change	A shadow will have the same shape as the object that cast it because light travels in a straight line along the edge of the object, creating a shadow with the same outline. Shadows can be bigger or smaller than the object that cast it depending on the angle and distance of the light source.	To pose questions	



SCIENCE: Progression map

		When an object is closer to the light source, the shadow is larger because the light rays have less distance to spread out.	
	To investigate what affects the angle of the reflected ray	<p>The law of reflection states that the angle of the incoming ray (the incident ray) is equal to that of the reflected ray.</p> <p>This law is only valid for a smooth surface, where light rays are reflected uniformly.</p>	To record results as a line graph
	To explain how a periscope works	<p>The key to a working periscope structure is to ensure that mirrors are fixed at 45° angle.</p> <p>Mirrors and periscopes work using reflection of light on smooth surfaces.</p>	
	To explain how mirrors are helpful	<p>Mirrors can help us to see something in an awkward position.</p> <p>Mirrors can make certain jobs easier, such as driving.</p>	To explore different jobs or inventions that depend on reflection.
Sticky Knowledge <i>(assessment questions)</i>	<p>Q What type of line does light travel in Straight</p> <p>Q How does light enter the eye? Through the pupil</p> <p>Q What is a luminous object? Something which gives off light (e.g. light bulb)</p> <p>Q Why do shadows have the same shape as the object it's formed from? Because light travels in a straight line along the edge of the object, creating a shadow with the same outline.</p>		



SCIENCE: Progression map

		Q What affects the size of a shadow? How close / far away it is from the light source (distance) and / or the angle from the light source.		
Year 6 Circuits, batteries and switches	Prior knowledge	Children need to know/ be able to: <ul style="list-style-type: none"> ◦ construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers ◦ recognise that a switch opens and closes a 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 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Cell Circuit Electrical Component	To recognise symbols for electrical components	Circuit symbols are standardised so everyone uses the same one to make it recognisable and safer. Symbols can be easily understood with no language barriers.	
	Current Resistance Circuit diagram Voltage	To predict and present results for electrical circuits	For a circuit to work, it must have a power supply, a complete loop and at least one device (bulb, buzzer or motor).	To use standardised symbols when drawing diagrams
	Fair test Variable Control variable	To recognise the link between the number of components and resistance	The more bulbs there are in a circuit, the more resistance there will be, resulting in a dimmer light.	To explain results using scientific knowledge
Evidence predict Design Explain	To identify ways to change voltage within an electrical circuit	Voltage measures the energy carried by the charge flowing in a circuit. It is the electrical 'push' from the power source.	To design a results table	



SCIENCE: Progression map

		Smaller or less powerful electrical appliances require less voltage than larger or more powerful appliances.	
	To investigate how voltage affects bulb brightness	The more cells or the higher the voltage, the greater the bulb's brightness. This is because current is being pushed through the circuit quicker so energy is transferred to the component quicker.	To plan an enquiry
	To apply knowledge of circuits and components to a practical solution	A switch is something that breaks and completes a circuit. If there are two switches in a circuit, both must be closed for the component to function.	To recognise that scientific knowledge can solve a problem
Sticky Knowledge (assessment questions)	Q Provide children with symbols for bulb, cell, switch, motor – can they name them?		
	Q What is a component? The individual parts which make up a circuit (e.g. wire, bulb)		
	Q What unit of measure is used for electrical current? Voltage (V)		
	Q How do you increase the voltage within a circuit? Increase the power source and / or decrease the number of components in the circuit		
	Q Show children a diagram of a circuit – can they suggest what it may represent (e.g. torch, doorbell)		
Chemistry Materials			
Y e a	Prior knowledge	Children need to know/ be able to:	



SCIENCE: Progression map

<i>New unit of learning for Key Stage 2</i>			
Vocabulary	Learning outcome	Knowledge	Working Scientifically
Soil Rock Sedimentary rock Sedimentation Crystal Grains Fossil Physical property Formation Drainage rate Permeable Predict Group Observe Compare	To group rocks using their appearance.	Some rocks contain visible grains, which are the little pieces from which the rocks are made. Some rocks contain crystals which are recognisable because they sparkle. Rocks can vary by colour, visible holes, shiny or dull and large or small grains.	To observe the appearance of rocks closely, using a magnifying glass.
	To group rocks using their physical properties.	Different rocks have different physical properties: hardness, reaction to acid rain and absorbency. The properties of a rock determine its uses.	To make predictions, suggest improvements and explain observations over time.
	To describe the process of fossil formation.	Rocks be worn away over time due to rainwater, rivers and streams, waves, wind, ice, plants and animals. When sedimentary rocks are worn away, they can sometimes reveal a fossil inside. Sometimes living things can die, get trapped between the layers and turn into fossils.	To present research on fossil formation.
	To identify fossils and group rocks accordingly.	People who look for fossils are called palaeontologists. Fossils can tell palaeontologists about the environment and types of creatures in different eras.	To use the fossil record to answer questions about the past.



SCIENCE: Progression map

	<p>To compare soils and how they were formed.</p>	<p>There are different types of soil (sandy, clay and peaty) that have different types and amounts of sediment in them.</p> <p>Soils are made from rocks and dead matter.</p> <p>Different soils have different drainage rates (how quickly water passes through them) and are therefore suited to different uses.</p>	<p>To record the drainage rate for different soils in a bar chart.</p>
	<p>To describe a soil sample using sedimentation.</p>	<p>Sedimentation is the process by which solid pieces settle to the bottom of a liquid.</p> <p>Sedimentation can be used to separate soils based on the size and weight of the different grains.</p> <p>Sedimentation can be used to compare the composition of different soils and categorise them as sandy, clay, loam or peaty.</p>	<p>To draw and label a diagram.</p>
	<p>Sticky Knowledge <i>(assessment questions)</i></p>	<p>Q Can you name a rock which contains crystals? Granite</p> <p>Q What word describes a rock which absorbs water? Permeable</p> <p>Q What replaces parts of living things as a fossil is formed? Minerals</p> <p>Q How is a fossil formed?</p>	



SCIENCE: Progression map

		<p>When the living thing dies and is buried by sediment (mud, sand). Over a long period this hardens to form rock and the remains are replaced by minerals.</p> <p>Q Why does sandy soil drain quicker than clay soil? Sandy soil has larger grains with more space between them</p>		
Year 4 States of Matter	Prior knowledge	<p>Children need to know/ be able to:</p> <ul style="list-style-type: none"> ◦ identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock ◦ describe the simple physical properties of a variety of everyday materials ◦ compare and group together a variety of everyday materials on the basis of their simple physical properties ◦ identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses ◦ find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	<p>Freeze</p> <p>Boil</p> <p>Melt</p> <p>Temperature</p> <p>Thermometer</p>	<p>To identify solids using their properties.</p>	<p>The property of a solid is that it keeps its shape unless force is applied to it.</p> <p>Examples of solids include sand, putty, plastic blocks, wooden bricks and rock.</p>	<p>To ask relevant questions about the properties of solids.</p>
	<p>Solid</p> <p>Liquid</p> <p>Gas</p> <p>Evaporate</p> <p>Condense</p> <p>Precipitation</p> <p>The water cycle</p> <p>Measure</p>	<p>To identify liquids and gases using their properties.</p>	<p>Gas does not have a fixed shape and can escape from an unsealed container.</p> <p>Gases include air, oxygen and carbon dioxide.</p> <p>Liquids can flow freely and take on the shape of a container.</p> <p>Examples of liquids include water, oil and honey.</p>	<p>To use results to draw simple conclusions about the properties of liquids.</p>



SCIENCE: Progression map

<p>Predict Conclude Investigate</p>	<p>To describe melting and freezing.</p>	<p>The melting point of water is zero degrees Celsius and the boiling point of water is 100 degrees Celsius.</p> <p>Heating causes solids to turn into liquids (melting). Freezing turns a liquid into a solid.</p>	<p>To use thermometers to take accurate measurements before and after melting.</p>
	<p>To describe condensing and evaporating.</p>	<p>To evaporate a liquid, it needs to be heated and to condense a liquid, it needs to be cooled.</p> <p>When a liquid evaporates it turns into a gas.</p> <p>Water can exist as a liquid, solid or gas.</p>	<p>To make predictions for new values about evaporation rates.</p>
	<p>To describe the different stages of the water cycle.</p>	<p>Water flows around the world in a continuous process of the water cycle (stages: evaporation, condensing, precipitating and run-off).</p> <p>Changes of state that occur during the water cycle are liquid water evaporates into gaseous water vapour, which cools and condenses into liquid precipitation (for example, rain) or freezes into solid precipitation (for example, snow).</p>	<p>To record the stages of the water cycle using a labelled diagram.</p>
	<p>To describe how temperature affects evaporation rates and the water cycle.</p>	<p>The Earth is getting warmer due to human activities creating harmful greenhouse gases that trap heat from the sun. This is called climate change.</p> <p>Hotter temperatures cause more water to evaporate and condense into clouds</p>	<p>To research climate change and the water cycle.</p>



SCIENCE: Progression map

			resulting in some areas receiving more rainfall which causes flooding.	
	Sticky Knowledge (assessment questions)	<p>Q Which state of matter has a fixed shape and volume? Solid</p> <p>Q Which state can be most easily compressed? Gas</p> <p>Q What is the change from a liquid to a solid called? Freezing</p> <p>Q What is the melting point of ice? 0 degrees Celsius</p> <p>Q What is the opposite process to evaporating? Condensation</p> <p>Q Five children a diagram of the water cycle to label and write an explanation for.</p>		
Year 5 Mixtures and Separation	Prior knowledge	Children need to know/ be able to: <ul style="list-style-type: none"> ◦ compare and group materials together, according to whether they are solids, liquids or gases ◦ 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 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Evaporation Solid Liquid Gas Dissolve	To describe mixtures.	A mixture is when two or more substances are mixed together but remain present. Some common examples of mixtures include air, soil, seawater and sand.	To research using a range of secondary sources.



SCIENCE: Progression map

<p>Filter Mixture Soluble Insoluble Solution Sieve</p> <p>Variable Fair test Explain Observe</p>	<p>To explain the process of sieving.</p>	<p>Sieving is the passing of a mixture through a sieve to separate different sized pieces.</p> <p>Sieving can be used to separate solid-solid mixtures with different sized pieces.</p> <p>Sieving separates mixtures using increasingly small holes to separate pieces from biggest to smallest.</p>	<p>To draw and annotate a diagram to explain a concept.</p>
	<p>To explain the process of filtering</p>	<p>Filtering is a technique in which liquid-solid mixtures are separated by passing them through a material with gaps.</p> <p>Filtering separates mixtures by trapping larger solid particles and letting smaller liquid particles pass through.</p> <p>Filtering should be used to separate liquid-solid mixtures in which the solid particles are large enough to be trapped by the filter.</p>	<p>To identify testable questions and how to answer them.</p>
	<p>To describe solutions and how they can be identified.</p>	<p>Dissolving is when a substance breaks apart and spreads out in a liquid.</p> <p>Some common examples of solutions include tea, saltwater, fizzy drinks and sugar and water.</p> <p>Solutions are clear with no visible particles.</p>	<p>To make observations about solutions.</p>
	<p>To identify which factors affect the time taken to dissolve.</p>	<p>Factors that affect dissolving include temperature, stirring, size of substance, type of substance and type of liquid.</p>	<p>To plan a fair test with consideration of variables and measurements.</p>



SCIENCE: Progression map

		Temperature effects the time taken for a substance to dissolve (the higher the temperature, the faster the substance dissolves).	
	To describe the process of evaporation.	<p>Evaporating is when a liquid turns into a gas.</p> <p>Evaporating can separate solutions because the liquid part evaporates, leaving behind the dissolved solid.</p> <p>Evaporating should be used to separate solutions.</p>	
Sticky Knowledge (assessment questions)	Q Which method is best to separate flour and water?	Filtering	
	Q What type of mixture would sieving separate?	Solids with different size particles	
	Q What process has to happen for a solution to be made?	Dissolving	
	Q How many substances are in a mixture?	Two or more	
	Q What factors will affect the time taken to dissolve?	temperature, stirring, size of substance, type of substance and type of liquid	
	Q What is evaporation?	When a liquid turns into a gas	
Y e a	Prior knowledge	Children need to know/ be able to:	



SCIENCE: Progression map

- 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)
- that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- recognise some common conductors and insulators, and associate metals with being good conductors

Vocabulary	Learning outcome	Knowledge	Working Scientifically
Hazard Safety Burn Electrical Insulator Conductor Electrical conductivity Thermal conductivity Reversible change Irreversible change Transparency Plan Predict Observe Analyse	To determine the hardness of materials and link this to their uses.	Hardness is a measure of how easily scratched or dented a material is.	To evaluate the hardness test to determine the degree of trust in the results.
	To determine the transparency of different materials and link this to their uses.	Transparency is a measure of the amount of light that passes through a material.	To plan and draw a table of results.
	To determine the conductivity of different materials and link this to their uses.	Electrical conductivity is a measure of how quickly and easily an electrical charge passes through a material. Thermal conductivity is a measure of how quickly and easily heat passes through a material.	To write a detailed, organised method that is easy to follow.
	To demonstrate reversible changes.	A reversible change is when a material undergoes a change that can be easily undone to return the material to its original form. Sieving, filtering and evaporating can be used to return a mixture or solution to its original form. Heating and cooling can be used to reverse the processes of freezing and condensing and melting and evaporating.	To write a prediction using prior knowledge of the states of matter.
To demonstrate irreversible changes.	An irreversible change is when a material undergoes a change that cannot be easily	To analyse observations about rusting and use them to support a conclusion.	



SCIENCE: Progression map

		<p>reversed and which produces a new material or materials.</p> <p>Rusting is an irreversible change and requires water and oxygen.</p> <p>Burning is an irreversible change and different materials burn in different ways.</p>	
	To demonstrate irreversible changes.	<p>Examples of when cooking is an irreversible change include baking a cake, making bread dough and cooking bacon.</p> <p>Mixing vinegar and bicarbonate of soda is an irreversible change.</p> <p>Some changes result in the formation of a new material.</p>	To measure the circumference of a balloon accurately.
	<p>Sticky Knowledge <i>(assessment questions)</i></p>	<p>Q What material is a good conductor? Metal</p> <p>Q What process reverses condensing? Evaporation</p> <p>Q What two conditions are needed for rusting? Air (oxygen) and water</p> <p>Q What is transparency? The amount of light which passes through a material</p> <p>Q What is an irreversible change? When a material undergoes a change that cannot be easily reversed and which produces a new material or materials (e.g. rusting, burning)</p> <p>Q What is conductivity a measure of?</p>	



SCIENCE: Progression map

How quickly / easily heat or electricity pass through a material/ object.

MAKING CONNECTIONS (additional unit Summer 2)

Year 3
Does hand span affect grip strength ?
(consolidation of movement and nutrition and rocks and solids)

Working scientifically

Children need to know/ be able to:

- ask relevant questions and use different types of scientific enquiries to answer them
- set up simple practical enquiries, comparative and fair tests
- make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment
- gather, record, classify and present data in a variety of ways to help in answer questions
- record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions identifying differences, similarities or changes related to simple scientific ideas and processes
- use straightforward scientific evidence to answer questions or to support their findings.

Vocabulary

Muscle
Nutrients
Friction
Joint

Question
Predict
Plan
Investigate
Conclude
Evaluate
Variable

Learning outcome

Investigating grip strength – planning.

Knowledge

Grip strength is the measure of the muscle strength of the forearm and hand muscles to pick objects up.

The variables that will change are handspan and the size of the object

The variables being measured will be hand span in cm's and the size of the object being picked up.

The variables kept the same will be the hand used and how the fruit is lifted.

Working Scientifically

To plan a pattern seeking enquiry.



SCIENCE: Progression map

	Investigating grip strength – gathering data.	<p>The nutrients found in fruits are vitamins, minerals, fibre, water and carbohydrates.</p> <p>The role of fruit in plant reproduction include: fruits contain seeds and fruits attract animals to eat them and spread the plant seeds in their poo.</p>	To gather and record data.
	Investigating grip strength – analysing, concluding and evaluating.	Friction helps with grip – the more friction there is, the easier it is to hold something.	<p>Draw a bar chart</p> <p>Write a conclusion</p> <p>Evaluate trustworthiness of a method</p> <p>Suggest improvements to a method.</p> <p>Pose further questions.</p>
	Investigating grip strength - extending	Wearing rubber gloves will increase friction and improve grip.	<p>To predict how wearing gloves will affect grip strength.</p> <p>To compare results</p> <p>Design a pair of snooker gloves based on data.</p>
	Investigating grip strength – presenting	<p>Joints for movement include: shoulder, elbow, hip, knee, ankle and neck.</p> <p>Shadows are formed when a light source is blocked by an object.</p>	<p>To summarise findings.</p> <p>To write a script to report on our findings.</p>
Scientific enquiry	<p>Assessment focus</p> <p>Make predictions and begin to give a reason</p> <ul style="list-style-type: none"> ◦ Make decisions about what to observe during an investigation. ◦ Take accurate measurements using standard units. ◦ Discuss enquiry methods and describe a fair test. ◦ Record their findings using scientific language and present in note form, writing frames, diagrams, tables and charts. ◦ Draw, with help, a simple conclusion based on evidence from an enquiry or observation. 		



SCIENCE: Progression map

		<ul style="list-style-type: none"> ◦ Gather, record and use data in a variety of ways ◦ to answer a simple question. 		
Year 4 – How does the flow of liquids compare ?	Working scientifically	Children need to know/ be able to: <ul style="list-style-type: none"> ◦ ask relevant questions and use different types of scientific enquiries to answer them ◦ set up simple practical enquiries, comparative and fair tests ◦ make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment ◦ gather, record, classify and present data in a variety of ways to help in answer questions ◦ record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables ◦ report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions ◦ use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions identifying differences, similarities or changes related to simple scientific ideas and processes ◦ use straightforward scientific evidence to answer questions or to support their findings. 		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	Liquid Temperature Circuit Sound wave Vibration Water cycle Evaporate Condense Viscosity Question Predict Plan Investigate	Investigating liquids - planning	A liquid is a state of matter that can flow or be poured and has no fixed volume or shape; it will take the shape of its container. The variable being measured will be the time it takes each liquid to flow. The variable kept the same will be the amount of liquid used each time, the temperature of the liquids and the angle of the flow. The variable being changed will be the viscosity of the liquids.	To write a prediction To sort variables.



SCIENCE: Progression map

	<p>Conclude Evaluate Variable</p>	Investigating liquids – gathering data.	A switch works by closing the gap in a circuit to complete it. When the switch is on the circuit is closed, when the switch is off, the circuit is broken and will not work.	<p>To gather and record data.</p> <p>To measure accurately in minutes.</p>
		Investigating liquids – analysing, concluding and evaluating.	<p>A sound wave is a vibration that travels through a medium, like air, creating a sound.</p> <p>Sound travels fastest through solids and slowest through gases.</p>	<p>To write a conclusion that refers to data.</p> <p>To evaluate the trustworthiness of a method.</p> <p>To suggest further questions.</p>
		Investigating liquids – extending.	<p>The organs of the digestive system are: mouth, oesophagus, stomach, small intestine and large intestine.</p> <p>Medicine can be absorbed through the skin or through the digestive system.</p>	<p>To observe the speed of absorption of different viscosity liquids.</p> <p>To select the best viscosity medicine for different purposes.</p>
		Investigating liquids – presenting.	<p>The stages of the water cycle are: evaporating, condensing, precipitation and run off.</p> <p>More viscous liquids evaporate slower and flow slower.</p>	<p>To create a poster to report our findings.</p> <p>To assess the effectiveness of a presentation.</p>
	Scientific enquiry	<p>Assessment focus</p> <ul style="list-style-type: none"> ◦ Suggest relevant questions and know that they could be answered in a variety of ways. Answer questions using straight forward scientific evidence. ◦ Make predictions and give a reason using simple scientific vocabulary. ◦ Make systematic and careful observations. ◦ Take accurate measurements using standard units and a range of equipment. ◦ Identify similarities/differences/changes when talking about scientific processes. ◦ Make decisions about different enquiries, including recognising when a fair test is necessary and begin to identify variables. ◦ Choose appropriate ways to record and present information, findings and conclusions for different audiences (e.g. displays, oral or written explanations). 		



SCIENCE: Progression map

		<ul style="list-style-type: none"> Use recorded data to make predictions, pose new questions and suggest improvements for further enquiries. Identify, with help, changes, patterns, similarities and differences in data to help form conclusions. Use scientific evidence to support their findings. 		
Year 5 – does the size of an asteroid affect the size of its impact crater?	Working scientifically	Children need to know/ be able to: <ul style="list-style-type: none"> plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs use test results to make predictions to set up further comparative and fair tests report and present 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 identify scientific evidence that has been used to support or refute ideas or arguments 		
	Vocabulary Air resistance Celestial bodies Gravity Force Asteroid Predict Fair test Variable Evaluate Conclusion	Learning outcome Investigating asteroid craters – planning.	Knowledge An asteroid is a small, rocky, irregular shaped object in space that orbits the sun.	Working Scientifically To form a prediction. To identify variables. To design a data table.
		Investigating asteroid craters – gathering data.	Gravity is the force that pulls objects towards the Earth. Air resistance works in the opposite direction to gravity.	To gather and record data. To measure accurately in centimetres.



SCIENCE: Progression map

			Asteroids are made from: rock such as basalt, metals like iron and nickel, and sometimes ice.	
		Investigating asteroid craters – concluding and evaluating.	<p>Forces can change the shape of an object.</p> <p>Iron and nickel can be separated from rock using a magnet.</p> <p>Small fragments of materials can be separated from larger materials through sieving.</p> <p>Materials can be removed from ice through melting.</p>	<p>To write a conclusion that refers to data.</p> <p>To evaluate the trustworthiness of a method.</p> <p>To suggest further questions.</p>
	Scientific enquiry	<p>Assessment focus:</p> <ul style="list-style-type: none"> ◦ Raise different types of scientific questions, and hypotheses. ◦ Make predictions and give a reason using scientific vocabulary. ◦ Plan and carry out comparative and fair tests, making systematic and careful observations. ◦ Take measurements using a range of scientific equipment with increasing accuracy and precision. ◦ Record data and results of increasing complexity using scientific diagrams, labels, tables, bar and line graphs and models. ◦ Use a simple mode of communication to justify their conclusions on a hypothesis. Begin to recognise how scientific ideas change over time. ◦ Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas 		
Year 6 – are some sunglasses	Working scientifically	<p>Children need to know/ be able to:</p> <ul style="list-style-type: none"> ◦ plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary ◦ take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate ◦ record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs 		



SCIENCE: Progression map

<p>es safer than others?</p>		<ul style="list-style-type: none"> ◦ use test results to make predictions to set up further comparative and fair tests ◦ report and present 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 <p>identify scientific evidence that has been used to support or refute ideas or arguments</p>		
	Vocabulary	Learning outcome	Knowledge	Working Scientifically
	<p>Translucent Opaque Adaptation Light source Non-luminous Electrical circuit</p> <p>UV radiation Vision</p>	Investigating sunglasses -Planning	<p>Sunlight can be harmful to our eyes and skin.</p> <p>Translucent materials allow some light to pass through.</p> <p>Sunglasses protect the eyes by reducing the amount of light entering the eye and reducing UV radiation entering the eye.</p>	<p>To form a prediction</p> <p>To identify variables to inform writing a method.</p> <p>To design a results table.</p>
	<p>Adaptation Circuit diagram</p> <p>Classify Identify Variable Investigate Predict Compare Conclude</p>	Investigating sunglasses - Gathering data	<p>Light sources we can use to investigate include: sunlight, a torch or an electrical circuit with a bulb.</p> <p>A brighter electrical circuit requires more voltage/more cells.</p>	<p>To measure accurately using a light meter.</p> <p>To record data.</p> <p>To calculate the mean average from repeat readings.</p>
		Investigating sunglasses – analysing, concluding and evaluating.	<p>Too much light can damage our eyes and cause problems with vision. This is an example of a change to physical health, which could also affect mental health.</p> <p>Sunglasses should not block all light as some light needs to enter our eyes to be able to see.</p>	<p>To draw a bar chart.</p> <p>To write a conclusion.</p> <p>To evaluate the trustworthiness of a method.</p> <p>To pose further question to extend the enquiry.</p>
	Investigating sunglasses – extending.	Adaptation is a characteristic which helps an organism survive in its habitat, which could be something physical on its body or how it behaves.	<p>To predict which pair of sunglasses will best protect from UV using prior results.</p> <p>To collect further data to answer a question.</p>	



SCIENCE: Progression map

		Many animals have opaque features that stop light passing through to the skin, such as reptiles' scales or mammals' fur.	To compare results from different tests.
	Investigating sunglasses – presenting.	Light travels in straight lines from a light source and reflects from non-luminous objects into our eyes. Too much light and UV can damage our eyes and affect our eyesight which is why sunglasses are so important.	To summarise our findings. To use the results as evidence of our conclusions. To refer to the trustworthiness of our results as part of advertising sunglasses.
	Scientific enquiry	Assessment focus: <ul style="list-style-type: none"> ◦ Pose/select the most appropriate line of enquiry to investigate scientific questions. ◦ Make predictions and give a reason using scientific vocabulary. Base predictions on scientific knowledge. ◦ Make their own decisions about which observations to make, using test results and observations to make predictions or set up further comparative or fair tests. ◦ Choose the most appropriate equipment in order to take measurements, explaining how to use it accurately. Decide how long to take measurements for, checking results with additional readings. ◦ Select and plan the most suitable line of enquiry, explaining which variables need to be controlled and why, in a variety of comparative and fair tests. ◦ Choose the most effective approach to record and report results, linking to mathematical knowledge. ◦ Identify validity of conclusion and required improvement to methodology. Discuss how scientific ideas develop over time. ◦ Identify and explain causal relationships in data and identify evidence that supports or refutes their findings, selecting fact from opinion. 	