

Science

Curriculum Progression of the Knowledge Essentials

Science Curriculum

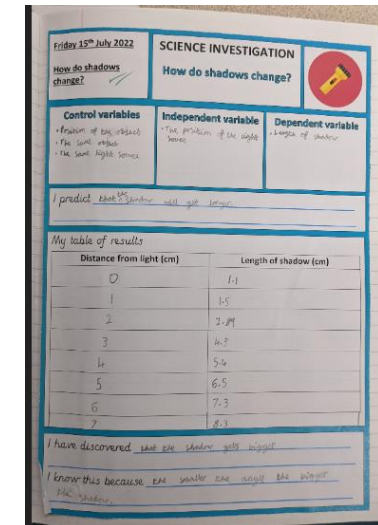
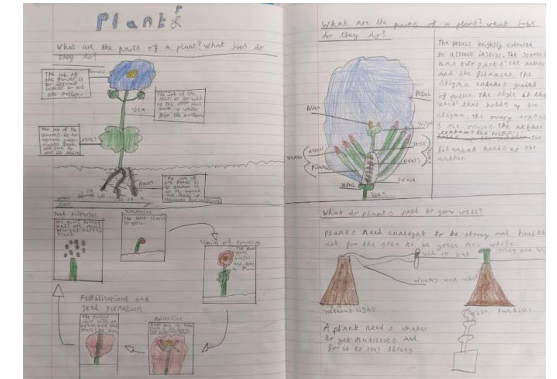
Knowledge Rich Curriculum

Knowledge has driven the philosophy in developing the Science curriculum. The knowledge essentials specify what children should know in as much detail as possible and content sequenced such that there is a coherent flow. This ensures ideas build on secure foundations, staged towards challenging goals. Careful sequencing ensures that elements are regularly returned to, supporting pupils to accumulate knowledge over time, feeding previous topics into current topics supported by Practice and Retrieval strategies.

In designing the curriculum, we have considered a broad range of knowledge forms with a focus on being able to articulate substantive and disciplinary knowledge:

- **Substantive knowledge** which is knowledge of the products of science, such as models, laws and theories.
- **Disciplinary knowledge** which is knowledge of the practices of science. This teaches pupils how scientific knowledge becomes established and gets revised. Importantly, this involves pupils learning about the many different types of scientific enquiry. It should not be reduced to learning a single scientific method.

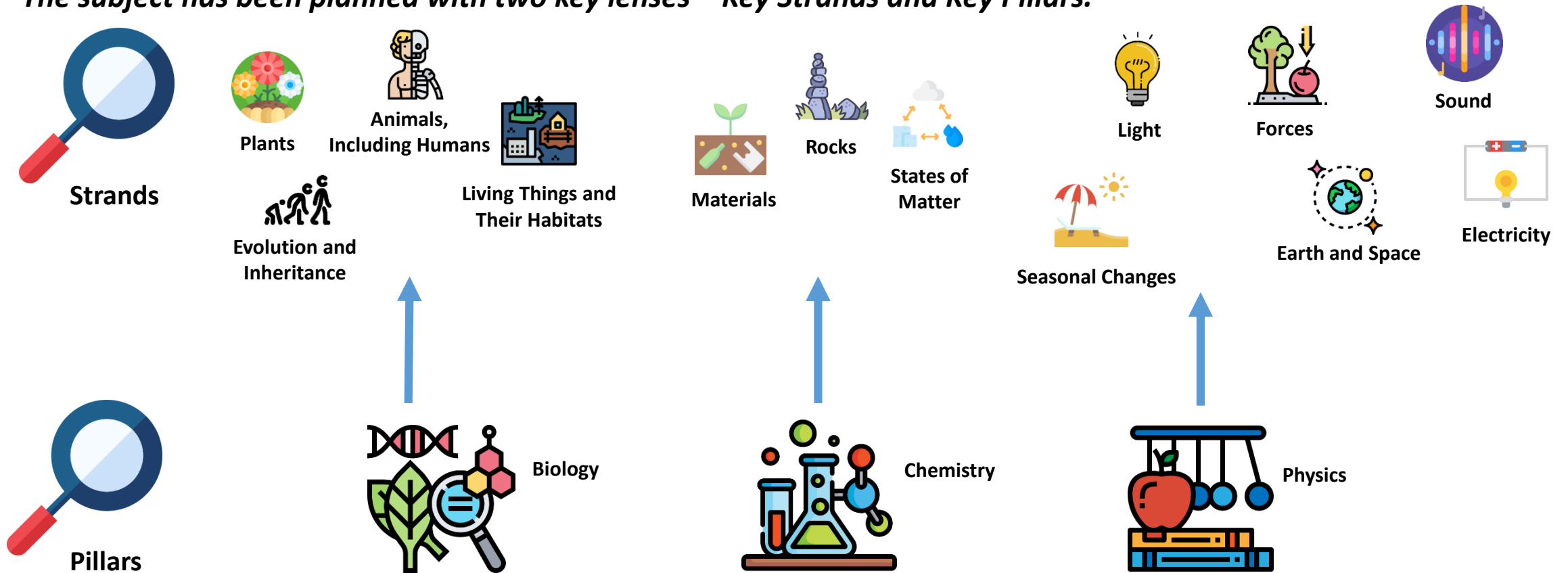
Knowledge is carefully sequenced to reveal the interplay between substantive and disciplinary knowledge. This ensures that pupils not only know 'the science'; they also know the evidence for it and can use this knowledge to work scientifically. As a result, pupils know more, remember more and can do more.



Science Curriculum

How is the Science Curriculum Organised?

The subject has been planned with two key lenses – Key Strands and Key Pillars.



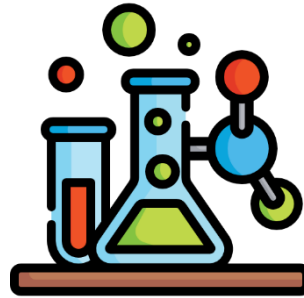
Science Curriculum

What are the Science Pillars?

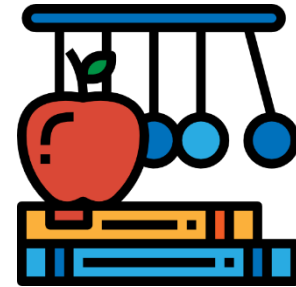
Pillars build knowledge sequentially with opportunities to revisit and build on children's prior learning – deepening knowledge and understanding. Links are made in learning through recurring themes throughout our curriculum.



Biology



Chemistry



Physics

























Working Scientifically



Science Curriculum










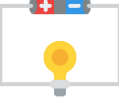










How is the Science Curriculum Organised?

	Biology 				Chemistry 				Physics 				
EYFS	Plants 	Animals, including humans 		Living things & their habitats 	Materials 			Seasonal change 		Forces 			
Year 1	Plants 	Animals, including humans 			Materials 			Seasonal changes 					
Year 2	Plants 	Animals, including humans 		Living things & their habitats 	Materials 								
Year 3	Plants 	Animals, including humans 				Rocks 			Light 	Forces 			

Science Curriculum





How is the Science Curriculum Organised?

	Biology 				Chemistry 				Physics 			
Year 4	Animals, including humans 		Living things & their habitats 			States of Matter 					Sound 	Electricity 
Year 5	Animals, including humans 		Living things & their habitats 	Materials 					Forces 	Earth and space 		
Year 6	Animals, including humans 	Evolution and inheritance 	Living things & their habitats 					Light 				Electricity 

Pillar Progression

Biology



Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Plants 	<p>Nursery</p> <ul style="list-style-type: none"> Understands the difference between plants and animals Can say what plants need to survive. Names and orders seasons. <p>Reception</p> <ul style="list-style-type: none"> Can say what plants need to survive Explores the natural world around them. Understand the effect of seasons on the natural world, discussing when and how things grow. Understands the need to respect and care for the natural environment and all living things. 	<ul style="list-style-type: none"> Write instructions to describe how to plant a bean. Identify some garden plants that they see in photographs or in the garden area of school Name some garden plants from memory. Identify some common plants on the school field or forest school area Label the parts of a plant. Sort leaves into groups of deciduous and evergreen. Collect information on a Wild Plant Hunt in the forest school area Generate questions about plants. Measure the growth of a bean plant with a ruler. 	<ul style="list-style-type: none"> Label the main parts of plants and trees Describe the stages in the life cycle of a plant. Explain that plants need water, light and a suitable temperature to grow well. Make observational drawings of plants. Record the growth of my plants in a bar chart. Use observations to explain how we can tell that plants are living things. Set up a simple comparative test. 	<ul style="list-style-type: none"> Identify the different parts of flowering plants. Identify the main stages of the life cycle of flowering plants. Explain the functions of the different parts of plants. Identify different parts of a flower. Identify and describe the stages of the life cycle of flowering plants. 			
Vocabulary 	Plants, seeds, water, light, life cycle, nature.	Common plant, wild plant, garden plant, deciduous, evergreen Plant, leaf, root, leaves, bud, flowers, blossom, petals, root, stem Tree, trunk, branch, leaf root fruit, vegetable, bulb, seed	water light suitable temperature grow healthy germination reproduction	structure flowering plants, roots, stem/trunk, leaves, flowers function nutrition, support, reproduction, makes its own food requirements for life and growth air, light, water, nutrients from the soil, room to grow needs vary, fertiliser life cycle flowers pollination, seed, formation, seed dispersal			

Thread Progression

Biology

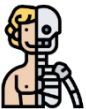


Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Evolution and Inheritance 							<ul style="list-style-type: none"> Identify inherited traits and adaptive traits. Understand that adaptations are random mutations. Examine fossil evidence supporting the idea of evolution. Identify the difference between selective and cross-breeding. Develop an understanding of the development of evolutionary ideas and theories over time. Explain how human evolution has occurred and compare modern humans with those of the same genus and family. Understand that adaptation and evolution is not a uniform process for all living things. Give examples of selective and crossbreeding.
Vocabulary 							<p>Evolution Adaptation Charles Darwin Alfred Wallace DNA, Genes Variation Parent Offspring Fossil Environment Habitat Fossilisation Plants Animals Living things</p>

Thread Progression

Biology




Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals, Including Humans 	<p>Nursery</p> <ul style="list-style-type: none"> Can name their 5 senses. Uses senses in hands on exploration Can explain the life cycle of a daffodil and a butterfly <p>Reception</p> <ul style="list-style-type: none"> Explain what their five senses are. Can talk about different life cycles 	<ul style="list-style-type: none"> name the basic parts of the body name the senses and say which body part is associated with each sense identify and name a range of common animals describe the structure of common animals, including some parts of the body that are specific to animals say something that is the same and something that is different about two animals understand that animals have different diets use their senses to perform simple tests. draw and label parts of their body describe activities that use each of the five senses sort animals into simple groups, including groups based on animal diets describe animal bodies using relevant vocabulary understand the difference between carnivores, herbivores and omnivore identify and classify animals by suggesting groups that they belong to 	<ul style="list-style-type: none"> Say how an animal will change as it grows. Collect and interpret results. Say how an animal gets air, food and water. Say what is healthy about their diet. Say how they could improve their diet. Give a reason why humans need to exercise. Name one effect that exercise has on the human body. Record information about exercise. Use information to answer questions. Give reasons why humans should keep themselves clean. 	<ul style="list-style-type: none"> Understand that plants and animals obtain food in different ways. Identify the right types and demonstrate they understand the right amounts of nutrients for animals including humans. Name the different types of skeletons as well as identify and categorise animals based on the type of skeleton it has. Identify the main bones in the body and how a skeleton protects, supports and helps the body to move. Explain how pairs of muscles work together to enable movement. Explain the different ways that plants and animals including humans obtain food. Explain the difference between food groups and nutrient groups. Explain what the right type and amounts of nutrition are for human beings as well as some of the consequences related to eating the wrong type of diet. Use the scientific names for the main bones in the human body and explain how the skeleton protects, supports and helps the body to move. 	<ul style="list-style-type: none"> Identify parts of the digestive system. Match the parts of the digestive system with their functions. Match the types and functions of teeth. Construct and interpret a food chain. 	<ul style="list-style-type: none"> Order the stages of human development. Demonstrate understanding of how babies grow in height. Describe the main changes that occur during puberty. Explain the main changes that take place in old age. Name the 6 stages of human development. Give reasons why changes occur during puberty. 	<ul style="list-style-type: none"> Demonstrate prior knowledge of systems within the human body. Explain the specific functions of the lungs in the circulatory system. Understand the processes of how water and nutrients are transported in the body. State the beneficial impact of a healthy diet and exercise on the human body. Describe how smoking cigarettes impacts negatively on the body.

Thread Progression

Biology



Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Vocabulary 	<p>Senses, touch, taste, sight, hearing, smell.</p>	<p>Common animals, fish, amphibians, reptiles, birds, mammals, pets</p> <p>Sense, taste, smell, vision, touch, hearing</p> <p>Head, leg, eyes, neck, knees, hair, arms, face, mouth, elbows, ears, teeth</p> <p>Omnivores, meat, plants, badger, human, bear, chicken</p> <p>Carnivores, meat, cat, dog, lion, tiger, fox, shark, killer whale, eagle, hawk, snake, tyrannosaurus rex</p> <p>Herbivores, plants, cows, horses, mice, elephants, deer</p>	<p>Offspring, grow, adults</p> <p>Survival, water, food, air, exercise, hygiene</p> <p>Nutrition, reproduce</p> <p>Egg, chick, chicken</p> <p>Egg, caterpillar, pupa, butterfly</p> <p>Spawn, tadpole, frog</p> <p>Lamb, sheep</p> <p>Baby, toddler, child, teenager, adult</p>	<p>Water</p> <p>Skeletons – support, protection</p> <p>Skull – brain</p> <p>Ribs – heart, lungs</p> <p>Movement</p> <p>Joint</p> <p>Muscles</p> <p>Relax</p> <p>Diet</p>	<p>Human digestive system</p> <p>Mouth</p> <p>Tongue – mixers, moistens, saliva</p> <p>Teeth – incisors – cutting, slicing</p> <p>Transports</p> <p>Stomach</p> <p>Acids</p> <p>Enzymes</p> <p>Small intestine – absorbs water</p> <p>Large intestine – compacts</p> <p>Carnivore</p> <p>Herbivore</p> <p>Brush</p> <p>Floss</p> <p>Food chain</p> <p>Producers</p> <p>Prey</p> <p>predators</p>	<p>Human development</p> <p>Baby – toddler – child – teenager – adult</p> <p>Puberty</p> <p>Length</p> <p>Mass</p> <p>Grows</p> <p>Grow</p> <p>growing</p>	<p>Heart, lungs, liver, kidney, brain</p> <p>Skeleton</p> <p>Skeletal</p> <p>Muscle</p> <p>Muscular</p> <p>Digest</p> <p>Digestion</p> <p>Digestive</p> <p>Heart, blood, vessels, Diet, exercise, lifestyle</p> <p>Nutrients</p> <p>Water</p> <p>Damage: drugs, alcohol</p>

Thread Progression

Biology




Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Living Things and Their Habitats</p>	<p>Nursery</p> <ul style="list-style-type: none"> Can say what plants need to survive. Names and orders seasons. Can explain the life cycle of a daffodil and a butterfly. Understands the difference between plants and animals. <p>Reception</p> <ul style="list-style-type: none"> Explores the natural world around them. Understand the effect of seasons on the natural world, discussing when and how things grow. Understands the need to respect and care for the natural environment and all living things. Can talk about different life cycles. Can say what plants need to survive. 		<ul style="list-style-type: none"> Say what is different about things that are living, dead or have never been alive. Identify some of the plants and animals in a familiar habitat. Sort objects into categories. Find microhabitats. Describe the conditions in a habitat. Ask questions about different habitats. Describe the characteristics of some plants and animals. Name some sources of food. Explain some of the life processes. Ask questions to decide if a thing is living, dead or has never been alive. Identify some plants and animals in global habitats. Draw a map of a local habitat. Sort objects into categories and give reasons for their choices. Identify and name minibeasts in microhabitats. Suggest how an animal is able to survive in their habitat. Answer questions about habitats they have researched. Explain why the animals in a habitat need the plants. Draw a simple food chain. 		<ul style="list-style-type: none"> Generate criteria to use to sort living things. Sort living things into a Venn diagram. Sort living things into a Carroll diagram. Use questions to sort animals using a key. Use a key to identify invertebrates by looking at their characteristics. Use the characteristics of living things to sort them using a classification key. Show the characteristics of living things in a table. Identify dangers to wildlife in the local and wider environment. 	<ul style="list-style-type: none"> Explain the function of the parts of a flower. Give two differences between sexual and asexual reproduction. Identify the features of plants pollinated by insects or the wind. Describe the stages of sexual reproduction. Describe the differences between the three types of mammals. Give four facts about Jane Goodall. Describe the stages of the life cycles of mammals, birds, insects and amphibians. Identify similarities and differences between the life cycles of different plants and animals. 	<ul style="list-style-type: none"> Give reasons for the classification of animals, using examples as a guide Classify living things using the Linnaean system Match groups of animals to their characteristics Classify creatures based on their characteristics Design a creature that has a specific set of characteristic, using prompts Describe the useful and harmful effects of different microorganisms Identify the variables in an investigation into harmful microorganisms Draw conclusion based on their results Describe the characteristics of different microorganisms Describe the characteristics of groups of organisms, using images as prompts

Thread Progression

Biology





Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Vocabulary 	Natural, change, plants, seeds, water, light, life cycle, young, old, Similar, different.		Living, dead, never alive, habitats, micro-habitats, food, food chain, sun, grass, cow, human, alive, healthy, logs Leaf litter, stony path, under bushes, shelter, seashore, woodland, ocean, rainforest, conditions, hot / warm / cold, dry / damp / wet, bright / shade / dark		Organism Variation Classification Reptile Bird Mammal Amphibian Fish Global Local Characteristic Key Habitat Environment Wildlife Endangered Extinct Conservation	Sexual Asexual Reproduction Cell Fertilisation Pollination Male Female Pregnancy Young Jane Goodall Mammal Amphibian Insect Egg Embryo Bird plant	Classify Compare Carl Linnaeus Bacteria Characteristics Classification Microorganism Organism Invertebrates Vertebrates Flowering Non-flowering

Thread Progression

Chemistry





Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Materials 	<p>Nursery</p> <ul style="list-style-type: none"> Explore collections of materials, identifying similar and different properties. <p>Reception</p> <ul style="list-style-type: none"> Talks about differences between materials and changes they notice. 	<ul style="list-style-type: none"> Identify and name everyday materials. Describe simple properties of everyday materials. Distinguish between an object and the material it is made from. Sort objects 3 ways. 	<ul style="list-style-type: none"> Identify and name everyday materials. Identify different uses of everyday materials. Demonstrate and explain how shapes of objects made from some materials can be changed. Explain what recycling means. Compare the uses of different everyday materials. Explain the advantages of recycling. Name the process invented by John McAdam. 			<ul style="list-style-type: none"> Follow instructions to test a material's properties. Explain the uses of thermal and electrical conductors and insulators. Order materials according to their electrical conductivity. Explain and investigate dissolving. Explain the processes used to separate mixtures. Explain irreversible changes. Identify the variables in an investigation. 	
Vocabulary 	<p>material, natural, change, similar, different.</p>	<p>Material, wood, plastic, glass, metal, water, rock, brick, paper, fabrics, elastic, foil</p> <p>Properties, hard/soft, stretchy/stiff, shiny/dull, rough/smooth, bendy/not bendy, waterproof/not waterproof, absorbent/not absorbent</p>	<p>Wood, metal, plastic, glass, brick, rock, paper, cardboard</p> <p>Squash, bend, twist, stretch</p> <p>Matches, floors, telegraph poles</p> <p>John Dunlop, rubber</p> <p>Charles Macintosh, waterproof fabric</p> <p>John McAdam, macadamisation</p> <p>Coins, cans, cars, table legs</p>			<p><u>Properties and Changes in Materials</u></p> <p>Properties: hardness, solubility, transparency, conductive (electrical and thermal), response to magnets</p> <p>Dissolve: liquid, solution</p> <p>Separate</p> <p>Separating</p> <p>Solids, liquids, gases: filtering, sieving, evaporating</p> <p>Reversible changes: dissolving, mixing, evaporating, filtering, sieving, melting</p> <p>Irreversible new material, burning, rusting</p> <p>Magnetism (Year 3)</p> <p>Electricity (Year 4)</p>	

Thread Progression

Chemistry



Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Rocks 				<ul style="list-style-type: none"> Children will be able to name the three different types of rocks. They will handle and examine rocks to identify their properties, with support. They will be able to state the four different types of matter that soil is composed of. Children will learn to make careful observations. Children will be able to give examples of natural and human-made rocks. They will be able to group rocks by their properties and identify simple similarities and differences. Children will be able to explain the difference between a bone and a fossil. They will be able to explain, using simple scientific language, how soil is formed. 			
Vocabulary 				<p>Appearance, physical, properties, hard/soft, shiny/dull, rough/smooth, absorbent/not absorbent, fossils</p> <p>Sedimentary, rock, soils, organic matter, buildings, gravestones, grains, crystals</p>			

Thread Progression

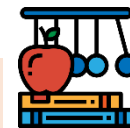
Chemistry





Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
States of Matter 					<ul style="list-style-type: none"> • identify and explain balanced and unbalanced forces • explain the difference between weight and mass • explain the link between the weight and mass of an object • make generalisations about how to increase the effects of air resistance • explain the conclusions and implications of Galileo's 'Tower of Pisa' experiment • explain how to minimise the effects of water resistance • make generalisations about the properties of materials that create the most friction • explain how a mechanism they have designed alters force and motion to achieve a purpose 		
Vocabulary 					Solid: iron, ice melt freeze liquid evaporate condense gas container changing state: chocolate, butter, cream heated heat cooled cool degrees Celsius thermometer water cycle: evaporate, Temperature: melting, melt ice – warm/cool Water: warm/cool water vapour		

Thread Progression

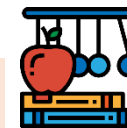
Physics



Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Seasonal Changes</p> 	<p>Nursery</p> <ul style="list-style-type: none"> Names and orders seasons. Can identify what you need to wear for each season and why. Understands that the weather changes and that in different countries you have different weather. <p>Reception</p> <ul style="list-style-type: none"> Understand the effect of seasons on the natural world, discussing when and how things grow. 	<ul style="list-style-type: none"> Name the four seasons. Name different types of weather. Make observations about the weather. Describe the weather associated with each season. Make simple observations about changes across the seasons by looking around school. name an event or occasion which happens in each season. describe how day length varies between two seasons make a more detailed comparison between two seasons. 					
<p>Vocabulary</p> 	<p>Autumn: harvest, scarecrow, combine harvester, fruit, vegetables, leaves, change, nocturnal</p> <p>Winter: frost, snow, freezing, icicles,</p> <p>Spring: Lifecycle, duckling, duck, egg, new life, growing, flowers, bulbs, seeds, butterfly, caterpillar, cocoon, chrysalis, lining things, habitats, garden, mini-beasts</p> <p>Summer: sunshine, warm, holidays, temperature, sunscreen, sunglasses, hot, bright, humid,</p>	<p>Season, summer, winter, autumn, spring, day, daytime</p> <p>Weather, wind, rain, snow, hail, sleet, fog, sun, hot, warm, cold</p>					

Thread Progression

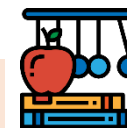
Physics





Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Light 				<ul style="list-style-type: none"> Identify light sources. Understand that we need light to see. Know that light travels in a straight line. Identify reflective surfaces. Know that the Sun can damage their eyes. Know how to protect their eyes from the Sun. Understand that a shadow is formed when a solid object blocks light. Understand that dark is the absence of light. Understand how surfaces reflect light. Recognise that a mirror appears to reverse an image. Identify some parts of the eye. Understand how the Sun can damage parts of the eye. Identify opaque, translucent and transparent objects. Know how shadows change size. 			<ul style="list-style-type: none"> Explain how light travels to enable us to see. Understand that all objects reflect light. Identify the angles of incidence and reflection. Understand refraction as light bending or changing direction. Explain how a prism allows us to see the visible spectrum. Understand that colours are a result of light reflecting off an object. Explain Isaac Newton's experiments about light and colour Understand how shadows change size. Understand that shadows are the same shape as the object that casts them.
Vocabulary 				Light See Dark Reflect Surface Natural Star Sun Moon Shadow Blocked Solid Torch Candle Lamp Sunlight Dangerous Protect eyes			Shadow Light Filter Colour Reflect Absorb Refract Spectrum Wavelength Prism Visible Lens Angle Straight Ray Beam Wave Energy

Thread Progression

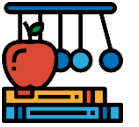
Physics





Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Forces 	<p>Nursery</p> <ul style="list-style-type: none"> Explores and talks about forces (push and pull). Explores how things work <p>Reception</p> <ul style="list-style-type: none"> Explores non-contact forces (gravity and magnetism). 			<ul style="list-style-type: none"> Identify forces as pushes and pulls. Describe friction as a force that slows objects down. Feel the pulling force of a magnet. Sort materials according to whether they are magnetic or not. Identify the different poles of a bar magnet. Use a magnetic compass with four points. Identify the type of force required to carry out an action. Investigate the force of friction produced by different surfaces. Explain that magnets produce an invisible pulling force. Identify magnetic materials. Identify different types of magnet. Investigate the strength of different magnets. Identify when magnets will repel or attract based on their poles. 		<ul style="list-style-type: none"> identify and explain balanced and unbalanced forces explain the difference between weight and mass explain the link between the weight and mass of an object make generalisations about how to increase the effects of air resistance explain the conclusions and implications of Galileo's 'Tower of Pisa' experiment explain how to minimise the effects of water resistance make generalisations about the properties of materials that create the most friction explain how a mechanism they have designed alters force and motion to achieve a purpose 	
Vocabulary 	<p>Nursery change, push, pull, stretch.</p> <p>Reception: Similar, different, gravity, magnets.</p>			<p><u>Forces and Magnets</u></p> <p>Force Push Pull Friction Surface Magnet Magnetic Pole North South Attract Repel compass</p>		<p><u>Forces</u></p> <p>Force Push Pull opposing Gravity Air resistance Water resistance Friction Isaac newton Galileo Galilei Streamline Brake Gear mechanism Lever Cog Pulley machine</p>	

Thread Progression

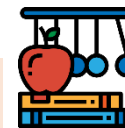
Physics

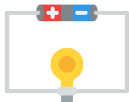



Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Sound 					<ul style="list-style-type: none"> • Explain how sound sources vibrate to make sounds. • Explain how vibrations change when the loudness of a sound changes. • Explain how sounds travel to reach our ears. • Describe the pitch of a sound. • Describe patterns between the pitch of a sound and the features of the object that made the sound. • Explain how sound travels through a string telephone. • Identify the best material for absorbing sound. • Create a musical instrument that can play high, low, loud and quiet sounds. 		
Vocabulary 					Volume Quiet Loud Ear Pitch High Low Instruments Wave		

Thread Progression

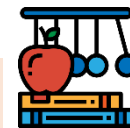
Physics



Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Electricity 					<ul style="list-style-type: none"> • identify electrical and nonelectrical appliances. • explain, with support, how a circuit works. • name at least two electrical conductors and insulators. • create a simple series circuit both with and without a switch. • Sort appliances based on whether they use mains or batteries. • explain how a switch turns the electric current on and off. 		<ul style="list-style-type: none"> • explain how our understanding of electricity has changed over time • draw circuit diagrams using the correct symbols and label the voltage correctly • explain how major discoveries led to the widespread use of electricity • explain the effect of increasing or decreasing the voltage on different parts of the circuit.
Vocabulary 					Electricity Electric current Appliances Mains Crocodile clips Wires Bulb Bulb holder Battery (cell) Battery holder Motor Buzzer Switch Conductor insulator		Electricity Electrical current Thomas Edison Nikola Tesla Alessandro Volta Battery Cell Bulb Wire Open switch Closed switch Motor Buzzer Circuit voltage Brightness loudness

Thread Progression

Physics



Strand	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Earth and Space 						<ul style="list-style-type: none"> Describe the Sun, Earth and Moon as spherical. Name the planets in the solar system independently. Distinguish between heliocentric and geocentric ideas of planetary movement. Explain that day and night is due to rotation of the Earth. Support the idea that different places on Earth experience night and day at different times with evidence. Explain how the Moon moves relative to the Earth. 	
Vocabulary 						Earth Sun Moon Mercury Venus Mars Jupiter Saturn Uranus Neptune Planets Solar system Day Night Rotate Orbit Axis Spherical	

Skills progression



Working scientifically – enquiry types

There are six areas of scientific enquiry:



- **Comparative / fair testing**



- **research**



- **Observation over time**



- **Pattern seeking**



- **Identifying, grouping and classifying**



- **Problem solving**

Comparative / fair testing

Changing one variable to see its effect on another, whilst keeping all others the same.



Research

Using secondary sources of information to answer scientific questions.



Observation over time

Observing changes that occur over a period of time ranging from minutes to months.



Pattern-seeking

Identifying patterns and looking for relationships in enquiries where variables are difficult to control.



Identifying, grouping and classifying

Making observations to name, sort and organise items.



Problem-solving

Applying prior scientific knowledge to find answers to problems.



Skills progression

Working scientifically – enquiry types



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Comparative / fair test			Which surface produces the most friction?	How are the vibrations different when we change the volume or the drum?	Which materials will dissolve?	In what conditions does mould grow quickest?
Research	How can we compare animals?	How are materials recycled?	What are the advantages and disadvantages of exoskeletons and endoskeletons?	What causes a species to become endangered?	What can you find out about a specific planet in our solar system?	What are the different species of human evolution?
Observation over time	How do plants grow?	Which objects will biodegrade?	What affects how a plant grows?	How can temperature change the state of materials?	How can we separate mixtures? (evaporation)	How does mould grow and what impacts its speed?
Pattern seeking	Does the same thing happen to all trees in winter?	How do humans change as they grow?	How does the position of a light affect the size of a shadow?	What is a food chain?	How do babies grow and develop?	Do all drugs have the same impact on the body?
Identifying, grouping and classifying	What material are these objects made from?	How can we classify materials? How can we classify animals?	Which rocks are igneous, metamorphic, sedimentary?	What materials are conductors or insulators?	How can we compare materials? What are conductors and insulators?	Can you design a classification system for living things?
Problem solving	What is the weather like in autumn and winter?	Do older children have bigger feet? Why do we exercise?	What is the best material to use when designing a book bag?	What makes a creature adapted to its habitat?	What is the best material for a lunch bag? (insulators)	Can you apply your knowledge or reflection to investigate how light travels?

Skills progression

Working scientifically



EYFS

Show curiosity about objects, events and people.

Question why things happen

Engage in open-ended activity

Take a risk, engage in new experiences and learn by trial and error

Find ways to solve problems / find new ways to do things / test their ideas

Develop ideas of grouping, sequences, cause and effect

Know about similarities and differences in relation to places, objects, materials and living things

Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world

Closely observes what animals, people and vehicles do

Uses senses to explore the world around them

Makes links and notices patterns in their experience

Choose the resources they need for their chosen activities

Handle equipment and tools effectively

Create simple representations of events, people and objects

Answer how and why questions about their experiences

Make observations of animals and plants and explain why some things occur, and talk about changes

Develop their own narratives and explanations by connecting ideas or events

Builds up vocabulary that reflects the breadth of their experience

Skills progression

Working scientifically



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Asking and answering questions	Use everyday language/begin to use simple scientific words to ask or answer a scientific question.	Suggest ideas, ask simple questions and know that they can be answered/investigated in different ways including simple secondary sources, such as books and video clips.	Use ideas to pose questions, independently, about the world around them.	Suggest relevant questions and know that they could be answered in a variety of ways, including using secondary sources such as ICT. Answer questions using straight forward scientific evidence.	Raise different types of scientific questions, and hypotheses.	Pose/select the most appropriate line of enquiry to investigate scientific questions.
Making predictions	Begin to say what might happen in an investigation.	Begin to make predictions	Make predictions and begin to give a reason.	Make predictions and give a reason using simple scientific vocabulary.	Make predictions and give a reason using scientific vocabulary.	Make predictions and give a reason using scientific vocabulary. Base predictions on findings from previous investigations
Making observations	Observe objects, materials and living things and describe what they see.	Observe something closely and describe changes over time.	Make decisions about what to observe during an investigation.	Make systematic and careful observations.	Plan and carry out comparative and fair tests, making systematic and careful observations.	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.

Skills progression

Working scientifically



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Equipment and measures	Use simple, nonstandard equipment and measurements in a practical task.	Use simple equipment, such as hand lenses or egg timers to take measurements, make observations and carry out simple tests.	Take accurate measurements using standard units.	Take accurate measurements using standard units and a range of equipment, including thermometers and data loggers.	Take measurements using a range of scientific equipment with increasing accuracy and precision.	Choose the most appropriate equipment in order to take measurements, explaining how to use it accurately. Decide how long to take measurements for, checking
Identifying and classifying	Sort and group objects, materials and living things, with help, according to simple observational features.	Decide, with help, how to group materials, living things and objects, noticing changes over time and beginning to see patterns.	Talk about criteria for grouping, sorting and categorising, beginning to see patterns and relationships.	Identify similarities/differences/changes when talking about scientific processes. Use and begin to create simple keys.	Use and develop keys to identify, classify and describe living things and materials.	Identify and explain patterns seen in the natural environment.
Engaging in practical enquiry (investigating)	Follow instructions to complete a simple test individually or in a group.	Do things in the correct order when performing a simple test and begin to recognise when something is unfair.	Discuss enquiry methods and describe a fair test.	Make decisions about different enquiries, including recognising when a fair test is necessary and begin to identify variables.	Plan a range of science enquiries, including comparative and fair tests.	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.

Skills progression

Working scientifically




	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Recording and reporting findings	Begin to record simple data. Talk about their findings and explain what they have found out	Gather data, record and talk about their findings, in a range of ways, using simple scientific vocabulary.	Record their findings using scientific language and present in note form, writing frames, diagrams, tables and charts	Choose appropriate ways to record and present information, findings and conclusions for different audiences (e.g. displays, oral or written explanations).	Record data and results of increasing complexity using scientific diagrams, labels, classification keys, tables, bar and line graphs and models.	Choose the most effective approach to record and report results, linking to mathematical knowledge.
Drawing conclusions	Explain, with help, what they think they have found out.	Use simple scientific language to explain what they have found out.	Draw, with help, a simple conclusion based on evidence from an enquiry or observation.	Use recorded data to make predictions, pose new questions and suggest improvements for further enquiries.	Use a simple mode of communication to justify their conclusions on a hypothesis. Begin to recognise how scientific ideas change over time.	Identify validity of conclusion and required improvement to methodology. Discuss how scientific ideas develop over time.
Analysing data Evaluating and raising further questions and predictions	Use every day or simple scientific language to ask and/or answer a question on given data.	Identify simple patterns and/or relationships using simple comparative language.	Gather, record and use data in a variety of ways to answer a simple question.	Identify, with help, changes, patterns, similarities and differences in data to help form conclusions. Use scientific evidence to support their findings.	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas.	Identify and explain causal relationships in data and identify evidence that supports or refutes their findings, selecting fact from opinion.

Skills progression

Working scientifically



Strand	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Vocabulary 	experience observe changes patterns grouping sorting classifying compare identify (name) data measure record equipment questions test investigate explore magnifying glass / hand lens same different		develop enquiry practical enquiry fair test comparative test relationships conclusion accurate thermometer data logger estimate data diagram key (identifying) table chart bar chart results predictions explanation reason similarity difference question evidence information findings criteria values properties characteristics			variables evidence justify accuracy precision scatter graphs bar graphs line graphs argument (science) causal relationship

Key Concept Progression

Life - The condition that distinguishes animals and plants from inorganic matter.



Year Group	What understanding and using that concept looks like...
EYFS	<ul style="list-style-type: none">• Identify and name common animals and plants: talk about change.
Year 1	<ul style="list-style-type: none">• Recognise and describe the differences and similarities in plants and animals (i.e. carnivores/herbivores/omnivores, fish, reptiles, mammals, amphibians, birds, deciduous and evergreen).
Year 2	<ul style="list-style-type: none">• Identify what living things needs to survive and flourish (i.e. food, water, exercise etc.).• Recognise and describe how living things differ to non-living things, and how they change as they grow (including plants and animals).• Construct and interpret food chains, identifying predators, producers and prey.
Year 3	<ul style="list-style-type: none">• Identify and describe the role of skeletons and the circulatory system in animals.• Describe the life cycle and process of reproduction in plants.• Explain the specific nutritional needs of plants, animals and humans.• Explain how different plants' needs vary.
Year 4	<ul style="list-style-type: none">• Sequence the simple functions of the digestive system, including the role of teeth.• Distinguish the functions of the heart, vessels, and blood.• Use classification keys to group living things.• Explain the impact of the environment on specific habitats.
Year 5	<ul style="list-style-type: none">• Describe the interdependence of organisms, including food webs and insect-pollinated crops. Describe reproduction in humans, including the development of male and female reproductive organs and systems.• Discern the differences in the life cycles of a mammal, amphibian, reptile, bird and fish.• Discern the processes of reproduction in plants and animals.
Year 6	<ul style="list-style-type: none">• Explain the mechanism of breathing and how this links to the circulatory system.• Describe the effects of diet, exercise, drugs and lifestyle on the way bodies function and the consequences of imbalance in the diet (i.e. drug abuse, eating disorders, the impact of maternal lifecycle on a foetus).• Reason about the classification of living things according to common observable characteristics.• Explain the concept of 'natural selection' and adaptation.• Explain how fossils provide information about the changes to living things over time.

Key Concept Progression

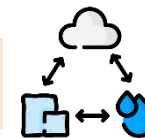
Energy - Power derived from the use of physical or chemical resources



Year Group	What understanding and using that concept looks like...
EYFS	<ul style="list-style-type: none">• Explore the effect of simple forces (i.e. pushes and pulls, magnets) through continuous provision.
Year 1	<ul style="list-style-type: none">• Identify and describe simple forces, including pushes and pulls.• Recognise that dark is the absence of light.• Observe the features associated with season change.
Year 2	<ul style="list-style-type: none">• Describe the effect of applying a greater or lesser force to object (i.e. pushing/pulling harder).• Recognise that light is reflected from surfaces.• Describe the features associated with season change.
Year 3	<ul style="list-style-type: none">• Compare and contrast the movement of objects across surfaces and explain this using knowledge of friction.• Explain how magnets attract and repel one another using knowledge of poles; use this to make predictions Identify the effect of the force of gravity.• Identify the effect of air resistance and water resistance on movement.• Recognise that light travels in straight lines and explain the effect of the position of an object in relation to a light source on its shadow.• Explain that objects are seen because they give out or reflect light into the eye.
Year 4	<ul style="list-style-type: none">• Describe the role of components in a circuit through construction and make predictions about components.• Recognise the impact of common conductors and insulators.• Recognise that sounds are made from vibrations and that these travel through different mediums to the ear: explore the impact of distance on volume.• Compare and contrast the pitch of sounds made by different materials.
Year 5	<ul style="list-style-type: none">• Explain the effect of the force of gravity, including its impact on the moon, planets and solar system.• Relate knowledge of air and water resistance to make predictions about the speed of movement.• Compare and contrast how pulleys, levers and gears enable a smaller force to have a greater effect.• Explain the effect of the earth's rotation, tilt and movement around the sun (i.e. day and night/movement of sun across sky/seasons).
Year 6	<ul style="list-style-type: none">• Compare and explain the effects of changes to voltage and position of components in an electrical circuit.• Represent circuits using recognised symbols.• Describe the concept of absorption linked to the transmission of light through material.• Explain imaging in mirrors using a ray model.

Key Concept Progression

Matter - Physical substance which occupies space and possesses rest mass



Year Group	What understanding and using that concept looks like...
EYFS	<ul style="list-style-type: none">• Experience, explore and describe a range of common materials.
Year 1	<ul style="list-style-type: none">• Describe, compare and group a variety of materials and their uses on the basis of their simple physical properties.
Year 2	<ul style="list-style-type: none">• Compare the suitability of materials for particular purposes.• Explore the how the shapes of materials can be changed by the application of force.
Year 3	<ul style="list-style-type: none">• Compare and group rocks on the basis of their simple physical properties.• Recognise that soils are made from rocks and organic matter.• Describe in simple terms how fossils are formed.
Year 4	<ul style="list-style-type: none">• Compare and group materials together according to whether they are solids liquids or gas.• Describe the impact of temperature on a range of materials.• Explore and describe the concepts of evaporation and condensation linked to the water cycle.
Year 5	<ul style="list-style-type: none">• Demonstrate that dissolving, mixing and changes of state are reversible changes.• Use knowledge of solids, liquids and gases to separate materials.• Explore and identify reversible and irreversible changes on the basis of temperature.• Justify the grouping of everyday materials based on evidence from comparative and fair tests.
Year 6	<ul style="list-style-type: none">• Explain changes of state in terms of particle model.• Use and explain simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography.

Key Concept Progression

Being Scientific - Investigating in a systematic and methodical way



Key Stage	What understanding and using that concept looks like...
EYFS	<ul style="list-style-type: none">• Explore, describe and question the world around them.
KS1	<ul style="list-style-type: none">• Ask simple questions and recognise that these can be answered in different ways.• Observe closely using simple equipment.• Carry out simple tests.• Identify and classify.• Gather and record data to help answer simple questions.• Use observations and ideas to suggest answers to questions.
LKS2	<ul style="list-style-type: none">• Ask relevant questions and use different types of scientific enquiry to answer them.• Carry out simple practical enquiries, comparative and fair tests.• Observe systematically and carefully; where appropriate take measurements using standard units Identify differences, similarities or changes related to simple scientific ideas or processes.• Gather, record, classify and present data to answer questions.• Report on findings of investigations.• Use scientific evidence to answer questions, draw simple conclusions, make predictions, suggests improvements and raise further questions.
UKS2	<ul style="list-style-type: none">• Plan different types of scientific enquiries to answer questions, including recognising and controlling variables.• Use test results to make predictions and to set up further comparative and fair tests.• Take measurements using a range of scientific equipment; record data and results accurately.• Report and present findings from enquiries.• Use scientific evidence to support or refute ideas or arguments.