

Science

Intent

Our science curriculum is based around the National curriculum. We harness children's natural curiosity about the world around them by encouraging them to be inquisitive and excited for future possibilities in science. We aim to equip children with the scientific knowledge and practical skills in the disciplines of biology, chemistry and physics to enable them to adapt and flourish in an increasingly scientific world both today and in the future. In order to work as scientists in the classroom, children develop systematic scientific enquiry throughout their time at school, ensuring the skills are built-on and developed at an age-appropriate level.

Rationale

Science across the Trust will cover: Chemistry, Biology and Physics

Each unit should be driven by children developing skills to support the Scientific enquiry for their year group and gaining knowledge. Children should be given opportunities to think independently and raise questions about working scientifically and the knowledge and skills that it brings, the scientific enquiry curriculum should be referred to when planning. They should become confident and competent in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations. Children should demonstrate scientific knowledge and understanding in written and verbal explanations, solving challenging problems and reporting scientific findings. There should be opportunities to undertake practical work in a variety of contexts, including fieldwork. Science units will be of varying length depending on content, and seasonal opportunities should also be accessed throughout the year.

Scientific Enquiry Skills -

- Testing skills - incorporates comparative and fair testing (controlled investigations)
- Identification skills - incorporates identifying, classifying and grouping
- Observational skills - incorporates observing over time AND pattern seeking
- Research skills - incorporates research using secondary sources

Working Scientifically -

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- Asking simple questions and recognising that they can be answered in different ways
- Observing closely, using simple equipment
- Performing simple tests
- Identifying and classifying
- Using their observations and ideas to suggest answers to questions

- Gathering and recording data to help in answering questions

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- Asking relevant questions and using different types of scientific enquiries to answer them
- Setting up simple practical enquiries, comparative and fair tests
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Using 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
- Using straightforward scientific evidence to answer questions or to support their findings.

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- Using test results to make predictions to set up further comparative and fair tests
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- Identifying scientific evidence that has been used to support or refute ideas or arguments

Science Curriculum

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Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know the key features of the life cycle of a plant.</p> <p>I know the key features of the life cycle of an animal.</p> <p>I am beginning to know how to respect and care for the natural environment and all living things.</p>	<p>I can plant seeds and care for growing plants.</p>	<p>I can explore and talk about different forces I can feel.</p> <p>I can explore collections of materials with similar and/or different properties</p>
Scientific skills - Observation	Vocabulary	
<p>I can use all of my senses in hands-on exploration of natural materials.</p> <p>I can talk about what I see, using a wide vocabulary</p> <p>I can talk about the differences between materials that I notice.</p> <p>I can talk about changes in materials that I notice.</p>	<p>Plant</p> <p>Seeds</p> <p>Grow</p> <p>Animal</p> <p>Natural</p> <p>Same</p> <p>Different</p>	

Reception	Knowledge	Scientific skills - Testing	Scientific skills - Identification
	I know that some environments are different to the one in which I live. I Know some similarities and differences between the natural world around me and contrasting environments. I know some important processes and changes in the natural world around me, including the seasons and changing states of matter.	I can explore changing states of matter in the natural world e.g. temperature, ice, water, evaporation.	I can describe what I see whilst outside. I can describe what I hear whilst outside. I can describe what I feel whilst outside.
	Scientific skills - Observation	Scientific skills - Research	Vocabulary
	I can explore the natural world around me. I can make observations and drawings of animals. I can make observations and drawings of plants. I can observe and talk about the changes in the seasons and the effect on the natural world.	I can draw information from books that have been read to me about some similarities and differences between the natural world around me and contrasting environments.	Environment Season Change Plant Animal hot/cold

Chemistry - Seasonal Changes		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
I know the seasons and know about the type of weather in each season and temperature change I know the changes in colour and weather within the four seasons. I know how rainfall/ wind direction can be measured. I know how day length varies.	I can perform simple comparative tests. I can gather and record simple data to help in answering questions. I can ask simple questions and recognise that they can be answered in different ways.	I can compare and describe weather in different seasons over a year.
Scientific skills - Observation	Scientific skills - Research	Vocabulary
I can gather and record simple data to help in answering questions. I can observe closely the changes across the four seasons using simple equipment. I can observe and describe weather associated with seasons and how the day length varies.	I can use simple secondary resources to find out information.	forecast, precipitation, estimation, measure, results, evaluation Weather - sunny, rainy, windy, snowy etc Seasons - winter, summer, spring, autumn Sun, sunrise, sunset, day length
Biology - Plants		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
I know the names of a variety of common wild and garden plants, including deciduous and evergreen trees I know and describe the basic structure of a variety of common flowering plants, including trees (including roots, stem/trunk, leaves) and have a basic understanding of their purpose	I can ask simple questions about plant structures and recognise that they can be answered in different ways. I can begin to record my measurements e.g. using a prepared table, pictogram, tally charts and block graphs. I can perform simple tests. I can gather and record simple data to help in answering questions.	I can classify leaves, seeds, flowers etc using a range of characteristics (use simple prepared tables or sorting rings) I can compare two leaves, seeds, flowers etc. I can identify plants by matching them to named images or using identification sheets. I can sort and group parts of plants using similarities and differences.
Scientific skills - Observation	Scientific skills - Research	Vocabulary

<p>I can observe closely how plants change over a period of time using simple equipment.</p> <p>I can use observations and ideas to suggest answers to questions.</p> <p>I can make close observations of leaves, seeds, flowers etc using senses and equipment such as magnifying glasses or digital microscopes.</p> <p>I can record my observations e.g. using photographs, videos, drawings, diagrams or in writing.</p>	<p>I can use secondary resources to find out information.</p>	<p>Deciduous, evergreen, leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bud</p> <p>Names of trees in the local area</p> <p>Names of garden and wild flowering plants in the local area</p>
<p>Biology- Animals</p>		
<p>Knowledge</p>	<p>Scientific skills - Testing</p>	<p>Scientific skills - Identification</p>
<p>I know variety of common animals including fish, amphibians, reptiles, birds and mammals (note - they do not need to use the terms mammal, reptile etc or know the characteristics of each)</p> <p>I know a variety of common animals that are carnivores, herbivores and omnivores.</p> <p>I know the structure of a variety of common animals (fish, amphibians, reptiles, bird)</p>	<p>I can ask simple questions (eg Do all dogs just eat meat?) (Which section of the tank do the tadpole prefer?)</p>	<p>I can compare two animals from the same or different groups.</p> <p>I can describe, compare and classify animals using a range of features including their structure, diet.</p> <p>I can identify animals by matching them to named images.</p> <p>I can sort and group animals using similarities and differences.</p> <p>I can use simple charts to identify unknown animals.</p>
<p>Scientific skills - Observation</p>	<p>Scientific skills - Research</p>	<p>Vocabulary</p>
<p>I can use my observations and ideas to suggest answers to questions.</p> <p>I can make first-hand, close observations of animals from each of the groups.</p>	<p>I can use secondary resources to name animals and find out information about them: what animals eat etc, this may include talking to experts e.g. pet owners, zookeepers etc.</p>	<p>carnivores, herbivores and omnivores, fish, amphibians, reptiles, bird</p> <p>head, body, eyes, ears, mouth, teeth, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves</p>
<p>Biology - Humans</p>		
<p>Knowledge</p>	<p>Scientific skills - Testing</p>	<p>Scientific skills - Identification</p>

<p>Know, name, draw and label the basic parts of the human body</p> <p>Know which part of the body is associated with each sense.</p>	<p>I can ask simple questions about body parts and recognise that they can be answered in different ways.</p> <p>I can perform simple tests.</p> <p>I can gather and record simple data to help in answering questions.</p>	<p>I can compare two people.</p> <p>I can look for patterns between people e.g. do people with big hands have big feet?</p> <p>I can use my senses to compare different textures, sounds and smells.</p>
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can observe closely, using simple equipment.</p> <p>I can use my observations and ideas to suggest answers to questions.</p> <p>I can make first-hand observations of parts of the body e.g. hands, eyes.</p>	<p>I can use secondary resources to find out information about the human body.</p>	<p>Head, body, eyes, ears, mouth, teeth, leg, neck, elbow, knees, face.</p> <p>Senses - touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue</p>
Everyday materials- Chemistry		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know the name of a variety of everyday materials, including wood, plastic, glass, metal, water and rock.</p> <p>I know the simple physical properties of a variety of everyday materials.</p> <p>I know the material from which an object is made and can describe them.</p>	<p>I can ask simple questions about properties of materials and recognise that they can be answered in different ways through gathering and recording simple data</p> <p>I can perform simple tests and can choose an appropriate method for testing an object for a particular property.</p> <p>I can use my test evidence to answer the questions about properties.e.g. "Which cloth is the most absorbent?"</p>	<p>I can compare and group together a variety of everyday materials on the basis of their simple physical properties.</p>
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can observe closely, using simple equipment.</p> <p>I can use my observations and ideas to suggest answers to questions about the properties of materials.</p>	<p>I can use secondary resources to find out the names of everyday materials and their properties</p>	<p>Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card, rubber, wool, clay</p> <p>Hard, soft, stretchy, stiff, bendy, floppy, rough, smooth, shiny, full, see-through, not see-through</p>
Forces- Physics		

Knowledge	Scientific skills - Testing	Scientific skills - Identification
I know and can describe how things move, using simple comparisons such as faster and slower. I know how different things move.	I can ask simple questions about how things move and recognise that they can be answered in different ways I can perform simple tests	I can identify and classify ideas to suggest answers to questions about how things move (push and pull)
Scientific skills - Observation	Scientific skills - Research	Vocabulary
I can observe closely and compare how things move, using simple equipment gathering and recording data to help in answering questions	I can use secondary resources to find out information	Push and pull Fast/er and slow/er

Living things and their habitats- biology

Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know what alive means</p> <p>I know that living things live in habitats to which they are suited</p> <p>I know a variety of plants and animals in their habitats, including micro-habitats</p> <p>I know 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.</p>	<p>I can ask simple questions about living things and recognise that they can be answered in different ways</p>	<p>I can compare the differences between things that are living, dead, and things that have never been alive</p> <p>I can identify animals' habitats to which they are suited</p> <p>I can identify and name a variety of plants and animals in their habitats, including micro-habitats</p>
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can observe animals and plants carefully in a range of habitats,</p> <p>I can observe how different habitats meet the basic needs of different kinds of animals and plants,</p> <p>I can observe and describe how different animals/ plants depend on each other (in their habitats)</p>	<p>I can use secondary resources to find out information</p> <p>I can use data to help in answering questions</p>	<p>Habitat</p> <p>Micro-habitat small habitat</p> <p>seashore, in woodland, in the ocean, in the rainforest</p>

Plants- biology

Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know how seeds and bulbs grow into mature plants.</p> <p>I know plants need water, light and a suitable temperature to grow and stay healthy.</p>	<p>I can ask simple questions about the growth of plants and recognise that they can be answered in different ways</p> <p>I can find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p> <p>I can perform simple tests</p>	<p>I can identify and classify ideas to suggest answers to questions about plants.</p>
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can observe closely, using simple equipment how seeds and bulbs grow</p>	<p>I can use secondary resources to find out information</p>	<p>germination, growth and survival, reproduction</p>

I can gather and record data to help answer questions about how plants grow		
Animals, including humans- biology		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
I know that animals, including humans, have offspring which grow into adults I know about and describe the basic needs of animals, including humans, for survival (water, food and air) I know the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	I can perform simple tests which answer simple questions about humans	I can identify and classify ideas to suggest answers to questions about animals
Scientific skills - Observation	Scientific skills - Research	Vocabulary
I can observe closely, using simple equipment gathering and recording data to help in answering questions about humans	I can use secondary resources to find out information humans and animals	Humans, offsprings, survival, exercise, hygiene, nutrition, growth
Chemistry - Use of everyday materials		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
I know the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses I know the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	I can ask simple questions and recognise that they can be answered in different ways I can find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. I can perform simple tests	I can identify and classify a variety of everyday materials to suggest answers to questions I can compare the uses of everyday materials
Scientific skills - Observation	Scientific skills - Research	Vocabulary
I can observe closely, using simple equipment gathering and recording data to help in answering questions	I can use secondary resources to find out information about the uses and properties of materials.	squashing, bending, twisting and stretching. waterproof, absorbent (plus recap y1)

I can use secondary sources to find out about John Dunlop, Charles Macintosh or John McAdam.

Physics - Light and electricity

Knowledge

I know some common appliances
I know what a simple electrical circuit is

Scientific skills - Testing

I can ask simple questions and recognise that they can be answered in different ways
I can construct a simple electrical circuit

Scientific skills - Identification

I can identify and classify some common appliances

Scientific skills - Observation

I can observe and name a variety of sources of light
I can observe closely, using simple equipment gathering and recording data to help in answering questions

Scientific skills - Research

I can use secondary resources to find out information electricity

Vocabulary

Electricity circuits, bulbs light wires batteries
light sources
Electrical appliances

Biology - Plants

Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know the functions of different parts of flowering plants: roots, stem, leaves and flowers.</p> <p>I know the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.</p> <p>I know the way in which water is transported within plants.</p> <p>I know the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p>	<p>I can investigate using simple practical enquiries, comparative and fair tests. and ask questions about what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amounts of space.</p>	<p>I can use identification keys to identify different types of flowers.</p> <p>I can classify seeds in a range of ways, including by how they are dispersed.</p>

Scientific skills - Observation	Scientific skills - Research	Vocabulary
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<p>I can make systematic observations and record findings about what happens to plants over time when the leaves are moved or roots are removed, retaking accurate measurements using standard units and equipment.</p> <p>I can observe the effect of putting white carnations or celery in coloured water.</p> <p>I can make close observations of seeds to decide on their methods of dispersal.</p> <p>I can observe what happens to a plant over time (for example when the leaves or roots are removed).</p>	<p>I can use secondary research to find out answers to questions about the different types of seed dispersal.</p> <p>I can report findings using simple scientific language, drawings, labelled diagrams</p>	<p>photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal)</p>
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Physics - Rocks and soils

Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>Know that rocks can be compared and grouped together on the basis of their appearance and simple physical properties.</p> <p>Know that soils are made from rocks and organic matter.</p>	<p>I can set up simple practical enquiries, comparative and fair tests.</p> <p>I can ask questions and test a range of rocks to find their characteristics to match a purpose</p>	<p>I can compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p>

Know how (in simple terms) fossils are formed when things that have lived are trapped within rock.	I can make predictions, suggest improvements and raise further questions.	I can use identification keys to identify different types of rocks.
Scientific skills - Observation	Scientific skills - Research	Vocabulary
I can make systematic observations, taking accurate measurements using standard units, using a range of equipment. I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.	I can research using secondary sources to find out how fossils are formed. I can ask relevant questions about rocks and soils and using different types of scientific enquiries to answer them. I can use secondary sources to research the work of Mary Anning.	Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, soil, peat, sandy/chalky/clay soil, sedimentary, Various types of rock - marble, chalk, granite, sandstone, slate
Biology - Teeth and eating		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
I know that animals, including humans, need the right types and amounts of nutrition, and that they cannot make their own food; they get nutrition from what they eat I know an adequate and varied diet is needed to keep healthy I know that animals have different teeth depending upon their diet I know why humans have two sets of teeth during their lifetime I know how and why oral hygiene is important	I can set up simple practical enquiries, comparative and fair tests to investigate tooth decay I can make predictions, suggest improvements and raise further questions	I can identify different teeth and understand their functions
Scientific skills - Observation	Scientific skills - Research	Vocabulary
I can make systematic observations, taking accurate measurements using standard units and equipment I can record/ report/ conclude findings using scientific language, drawings, labelled diagrams, keys, bar charts and tables and in oral and written explanations, and use this to answer a question	I can ask relevant questions about teeth and diet and use different types of scientific enquiries to answer them. I can use secondary research to identify animals in a habitat and find out what they eat.	mouth, teeth, saliva, incisor, canine, molar, premolar, herbivore, carnivore, omnivore, gums, decay, enamel, bacteria, carnivores, herbivores, omnivores,
Biology - Animals including humans		

Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know 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.</p> <p>I know that humans and some other animals have skeletons and muscles for support, protection and movement.</p> <p>I know the name of and the functions of the main parts of the musculoskeletal systems</p>	<p>I can ask relevant questions and use different types of scientific enquiries to answer them. <i>Do human skulls get bigger as we grow?</i></p>	<p>I can identify and group animals with and without skeletons, comparing their movement</p>
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can observe how a range of animals move related to their skeletal system.</p>	<p>I can report on findings from enquiries about animals, including oral and written explanations, displays or presentations</p> <p><i>What nutrition did I get from my school meal today? How does it help me body grow?</i></p>	<p>Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine</p>
Physics - Forces and Magnets		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know how things move on different surfaces.</p> <p>I know that some forces need contact between two objects, but magnetic forces can act at a distance</p> <p>I know how magnets attract or repel each other and attract some materials and not others.</p> <p>I know that magnets have two poles and know whether two magnets will attract or repel each other, depending on which poles are facing.</p>	<p>I can set up simple practical enquiries, comparative and fair tests to compare how things move on different surfaces/ magnetic properties of different materials</p> <p>I can predict whether two magnets will attract or repel each other, depending on which poles are facing.</p> <p>I can suggest improvements and raise further questions</p>	<p>I can compare and group everyday materials on the basis of whether they are attracted to a magnet.</p> <p>I can identify some magnetic materials.</p>
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can observe how magnets attract or repel each other and attract some materials and not others.</p>	<p>I can answer relevant questions about magnets and forces and using different types of scientific information</p>	<p>Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel,</p>

<p>I can make systematic observations, taking accurate measurements using standard units and equipment, when testing different surfaces</p> <p>I can record findings using scientific language, bar charts and tables to answer a question which explain conclusions in terms of the effect of the roughness or smoothness of surfaces</p> <p>I can use a force meter carefully to measure forces and know that this is measured in 'newtons'</p>		<p>magnetic material, metal, iron, steel, poles, north pole, south pole</p>
<p>Physics - Light</p>		
<p>Knowledge</p>	<p>Scientific skills - Testing</p>	<p>Scientific skills - Identification</p>
<p>I know that I need light in order to see things and that dark is the absence of light.</p> <p>I know that light is reflected from surfaces.</p> <p>I know that light from the sun can be dangerous and that there are ways to protect your eyes.</p> <p>I know that shadows are formed when the light from a light source is blocked by an opaque object.</p>	<p>I can set up simple practical enquiries, comparative and fair tests to investigate that shadows of objects in sunlight change in length and position over the course of the day</p> <p>I can make predictions about a range of materials/ objects and the shadows they may form, I can suggest improvements and raise further questions</p> <p>I can carry out a test to see which surface is the most reflective.</p>	<p>I can identify differences, similarities or changes related to simple scientific ideas and processes</p>
<p>Scientific skills - Observation</p>	<p>Scientific skills - Research</p>	<p>Vocabulary</p>
<p>I can find patterns in the way that the size of shadows change, through making systematic observations, taking accurate measurements using standard units and equipment.</p> <p>I can record findings using scientific language, drawings, labelled diagrams, keys, bar charts and tables and in oral and written explanations.</p>	<p>I can ask relevant questions and using different types of scientific enquiries to answer them</p>	<p>Light, light source, dark, shadow, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight</p>

Biology - Living things and their habitats

Knowledge

I know that living things can be grouped in a variety of ways.
 I know that classification keys can be used to help group, identify and name a variety of living things.
 I know that environments can change (both naturally and due to human impact) and know that this can sometimes pose dangers to living things.

Scientific skills - Testing

I can ask relevant questions about living things and their environment and use different types of scientific enquiry to answer them.
 I can use results to draw simple conclusions and raise further questions about the environment and habitats animals live in.

Scientific skills - Identification

I can classify a number of living things in my local environment according to their features.
 I can explore the use of classification keys to help group, identify and name a variety of living things in my local and wider environment.

Scientific skills - Observation

I can make careful observations about animals in their habitats at different times of the year.
 I can classify and present data in a variety of ways to help in answering questions. I can record findings using simple scientific language, drawings, labelled diagrams
 I can look for patterns between living things. E.g. Do plants with have? Do animals withhave.....?

Scientific skills - Research

I can use secondary sources to find out about how environments may naturally change.
 I can use secondary sources to find out about human impact, both positive and negative, on environments.
 I can use secondary research to name and find out about plants *and animals in the wider environment e.g. polar, jungle, desert.*
 I can use fieldwork to explore the human impact on my local environment e.g. litter, tree planting

Vocabulary

Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate

Biology - Animals, including humans

Knowledge

I know and can describe the simple functions of the basic parts of the digestive system in humans.
 I know and can identify the different types of teeth in humans and their simple functions.
 I know how to construct and interpret a variety of food chains, identifying producers, predators and prey.

Scientific skills - Testing

I can ask relevant questions about the digestive system and teeth and use different types of enquiry to answer them. including straightforward scientific evidence
 I can use results to draw simple conclusions and raise further questions about teeth and digestion.

Scientific skills - Identification

I can use food chains to identify producers, predators and prey within a habitat.
 I can compare and contrast different types of teeth (link to simple functions).

	I can compare teeth for carnivores and herbivores and can suggest reasons for differences.	
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can make systematic and careful observations.</p> <p>I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.</p> <p>I can make close observations of teeth in animal skulls and use my observations to classify animals as carnivores, herbivores or omnivores.</p> <p>I can draw and discuss my ideas about the digestive system and compare them with models or images.</p>	<p>I can create food chains based on secondary research.</p> <p>I can use secondary research: to find out about the functions of the digestive system, to find out what damages teeth and how to look after them.</p> <p>I can use secondary research to find out what different animals eat in different environments e.g. coral, polar, African grassland, and use this to construct food chains.</p>	<p>Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain</p>
Chemistry - States of matter		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p> <p>I know that materials can be grouped together according to whether they are solids, liquids or gases.</p> <p>I know and name the properties of solids, liquids and gases.</p> <p>I know that some materials change state when they are heated or cooled.</p>	<p>I can ask relevant questions about the water cycle and use different types of enquiry to answer them.</p> <p>I can set up simple practical enquiries, comparative and fair tests to explore the water cycle and material (Solids, Liquids and gases).</p> <p>I can investigate what affects the melting rate of chocolate (size of pieces, temperature of water, type of chocolate)?</p> <p>I can investigate what affects the rate of evaporation.</p>	<p>I can compare and group materials together, according to whether they are solids, liquids or gases, and give reasons to justify why.</p>
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.</p> <p>I can make systematic and careful observations, taking accurate measurements using standard units,</p>	<p>I can use secondary sources to find out about the water cycle, and present my findings in a variety of ways.</p> <p>I can research the melting points of different metals.</p>	<p>solids, liquids, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle, condensation, precipitation,</p>

<p>using a range of equipment, including thermometers and data loggers.</p> <p>I can 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.</p> <p>I can observe closely and classify a range of solids and liquids based on their properties.</p> <p>I can observe evaporation over a period of time.</p>		
Physics - Sound		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know how sounds are made and associate some of them with something vibrating</p> <p>I know that vibrations from sound travel through a medium to the ear.</p> <p>I know that there are patterns between the pitch of a sound and the features of the object that produced it</p> <p>I know that there are patterns between the volume of a sound and the strength of the vibrations that produced it.</p> <p>I know that sounds get fainter as the distance from the sound source increases.</p>	<p>I can ask relevant questions about sound and use different types of scientific enquiries to answer them.</p> <p>I can set up a simple practical enquiry to see which material provides the best insulation against sound.</p> <p>I can measure the volume from different instruments and</p> <p>I can measure how volume changes away from a source.</p>	<p>I can classify musical instruments based on my own criteria.</p>
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can make systematic and careful observations, and, where appropriate, take accurate measurements using standard units.</p> <p>I can find patterns between the pitch of a sound and features of the object that produce it.</p> <p>I can find patterns between the volume of a sound and the strength of the vibrations that produced it.</p>	<p>I can use secondary research to find out how different instruments from around the world work.</p> <p>I can use secondary research to find out about animals and their hearing.</p>	<p>Sound, source, vibrate, vibration, travel, pitch (high and low), volume, faint, loud, insulation</p>
Physics - Electricity		
Knowledge	Scientific skills - Testing	Scientific skills - Identification

<p>I know that and identify examples of common appliances run on electricity.</p> <p>I know how to construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</p> <p>I know that a lamp will only light in a simple series circuit if it is part of a complete loop with a battery.</p> <p>I know that switches open and close a circuit and associate this with whether or not a lamp lights in a simple series circuit.</p> <p>I know and recognise some common conductors and insulators.</p> <p>I know that metals are good conductors and can name some.</p>	<p>I can ask relevant questions about electricity and use different types of scientific enquiries to answer them.</p> <p>I can set up a comparative test to see which material is the best conductor of electricity.</p>	<p>I can identify, classify and group a variety of electrical insulators and conductors.</p> <p>I can classify household appliances and/or toys (electrical or not electrical, batteries or mains)</p>
<p>Scientific skills - Observation</p>	<p>Scientific skills - Research</p>	<p>Vocabulary</p>
<p>I can look for patterns between the brightness of a bulb and the number of batteries in a circuit.</p>	<p>I can use secondary research to find out how our ideas about electricity have changed over time.</p> <p>I can use secondary research to find out about the work of Thomas Edison and Joseph Swan</p>	<p>Electricity, electrical appliance / device, mains, plug, electrical circuit, complete circuit</p> <p>Component, symbol, cell, battery, crocodile clip, bulb, switch, buzzer, motor, bulb, wire, conductor, insulator</p> <p>metal, non-metal</p>

Physics - Earth and Space

Knowledge

I know the movement of the Earth, and other planets, relative to the Sun in the solar system.
 I know and describe the movement of the Moon relative to the Earth.
 I know and describe the shape of the Sun, Earth and Moon as approximately spherical bodies.
 I know that the Earth's rotation can be used to explain day and night and the apparent movement of the Sun across the sky.

Scientific skills - Testing

I can plan different types of scientific enquiry to answer questions, including recognising and controlling variables where necessary.

Scientific skills - Identification

I can compare and group planets e.g. moons, rings, gaseous, rocky etc.

Scientific skills - Observation

I can make observations of how shadows caused by the sun change throughout the day.
 I can show, using scientific diagrams and labels, the movement of the Earth around the Sun.
 I can create simple models to show the movement of the Moon around the Earth.
 I can take accurate measurements of shadows and present my data using a table.

Scientific skills - Research

I can use secondary sources to research and compare different time zones around the world.
 I can use secondary sources to find out how ideas about the solar system have developed over time (e.g. the works of scientists such as Ptolemy, Alhazen and Copernicus).
 I can use secondary sources to find out why structures such as Stonehenge might have been used as astronomical clocks.

Vocabulary

Earth, sun, moon
 Name of planets
 Spherical
 Solar System
 Rotates
 Star
 Orbits
 Planets
 Axis
 Celestial body

Physics - Forces

Knowledge

Scientific skills - Testing

Scientific skills - Identification

<p>I know that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>I know that air resistance, water resistance and friction act between moving surfaces.</p> <p>I know that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater impact.</p>	<p>I can investigate the effects of friction in a range of contexts, recognising and controlling variables e.g. trainers pulled with a force meter</p> <p>I can investigate the effects of water resistance in a range of contexts e.g. plasticine in cylinders of liquid.</p> <p>I can investigate the effects of air resistance in a range of contexts, recognising and controlling variables where necessary e.g. parachutes, spinners, sailing boats, straw rockets.</p> <p>I can use test results to make predictions to set up further comparative and fair tests.</p>	
<p>Scientific skills - Observation</p>	<p>Scientific skills - Research</p>	<p>Vocabulary</p>
<p>I can take measurements using a range of scientific equipment with increasing accuracy and precision, taking repeat readings when appropriate.</p> <p>I can record data and results of increasing complexity using scientific diagrams and labels, tables, scatter graphs, bar and line graphs.</p> <p>I can make observations to understand how levers, pulleys and gears allow a smaller force to have a greater impact (cross-curricular with DT)</p> <p>I can use force meters (N) to measure correctly and interpret the scales with increasing accuracy.</p> <p>I can use scientific labels and diagrams to show the forces acting upon objects.</p>	<p>I can use secondary sources to research how the work of scientists such as Galileo Galilei and Issac Newton helped to develop the theory of gravity.</p>	<p>force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears</p>
<p>Biology - Living things and their habitats</p>		
<p>Knowledge</p>	<p>Scientific skills - Testing</p>	<p>Scientific skills - Identification</p>
<p>I know that there are differences in the life cycles of a mammal, an amphibian, an insect and a bird.</p> <p>I know about and describe the life processes of reproduction in some plants and animals.</p> <p>I know the difference between sexual and asexual reproduction and can give examples of how plants reproduce in both ways.</p>	<p>I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p>	<p>I can compare two or more animal life cycles that I have studied.</p> <p>I can compare how different animals reproduce and grow.</p> <p>I can classify animals according to their life cycle.</p>
<p>Scientific skills - Observation</p>	<p>Scientific skills - Research</p>	<p>Vocabulary</p>

<p>I can record data using classification keys and tables. I can compare the gestation times for mammals and look for patterns I can grow and observe plants that reproduce asexually e.g. strawberries, spider plants, potatoes. I can observe new plants growing from different parts of the parent plant e.g. cuttings or seeds I can observe and compare the life cycles of plants and animals in my local environment with other plants and animals around the world (rainforest, ocean, desert)</p>	<p>I can use secondary sources to find out the work of naturalists and animal behaviourists, for example David Attenborough. I can use secondary sources to find out about pollination. I can use secondary sources to find out about the life cycle of chosen animals e.g. dragon fly, owl, worm, salmon I can use secondary sources to research how gardeners asexually reproduce plants.</p>	<p>Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings</p>
<p>Biology - Animals including humans</p>		
<p>Knowledge</p>	<p>Scientific skills - Testing</p>	<p>Scientific skills - Identification</p>
<p>I know that humans change as they develop into old age. I know the changes that take place in girls and boys during puberty. I know that a baby changes physically as it grows, and also what it is able to do.</p>	<p>I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p>	
<p>Scientific skills - Observation</p>	<p>Scientific skills - Research</p>	<p>Vocabulary</p>
	<p>I can develop questions to ask an expert e.g. a health visitor, a nurse, a doctor (questions will need to be filtered by a teacher.) I can use secondary research to find out and record the length and mass of a baby as it grows.</p>	<p>See RSE unit. Puberty Baby Child Adolescent Adult Puberty - the vocabulary to describe sexual characteristics.</p>
<p>Chemistry - Properties of materials</p>		
<p>Knowledge</p>	<p>Scientific skills - Testing</p>	<p>Scientific skills - Identification</p>
<p>I know that everyday materials can be compared and grouped together on the basis of their properties, including their hardness, solubility, transparency,</p>	<p>I can carry out comparative and fair tests to investigate the absorbency, recognising and controlling variables where necessary.</p>	<p>I can compare and group together everyday materials on the basis of their properties.</p>

conductivity (electrical and thermal) and response to magnets	I can give reasons, based on comparative and fair tests, for the particular uses of everyday materials e.g. Which materials would be the most effective for making blackout curtains?	I can compare different materials in order to make a switch in a circuit.
Scientific skills - Observation	Scientific skills - Research	Vocabulary
I can take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. I can record data and results of increasing complexity using scientific diagrams and labels, tables.	I can use secondary sources to research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton)	Thermal insulator Thermal conductor Electrical insulator Electrical conductor
Chemistry - Changes of materials		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
I know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. I know that mixtures can be separated through filtering, sieving and evaporating. I know that dissolving, mixing and changes of state are reversible changes. I know that some changes result in the formation of new materials, and that this kind of change is usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda	I can carry out comparative and fair tests to investigate the rate of solubility, recognising and controlling variables where necessary.	I can group solids based on my observations when mixing them with water.
Scientific skills - Observation	Scientific skills - Research	Vocabulary
I can observe rusting over time e.g. uncoated nails in different liquids. I can observe and compare the changes that take place, for example, when burning different materials or baking cakes. I can observe what happens when a range of solids are added to liquids.		change of state, mixture, dissolve, solution soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material

Biology - Living things and their habitats (10hrs-12hrs)

Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know that living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.</p> <p>I know that vertebrates can be divided into five small groups: fish, amphibians, reptiles, birds and mammals, and know that each group has common characteristics.</p> <p>I know that invertebrates can be divided into a number of groups including insects, spiders, snails and worms, and know some of the common characteristics of each.</p> <p>I know that plants can be divided into two main groups: flowering plants and non-flowering plants.</p>	<p>I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p>	<p>I can classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and keys.</p> <p>I can give reasons for classifying plants and animals based on specific characteristics.</p> <p>I can use classification materials to identify unknown plants and animals</p> <p>I can create classification keys for plants and animals.</p> <p>I can classify plants into flowering, mosses, ferns and conifers, based on specific characteristics.</p>
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can record data of increasing complexity using classification keys.</p> <p>I can use observations to identify characteristics of animals that belong to a group.</p> <p>I can observe what happens to a piece of bread over time when left in different conditions.</p> <p>I can make careful observations of unknown animals e.g. platypus and use my knowledge of characteristics to assign it to a group.</p>	<p>I can use secondary sources to learn about the form classification system devised by Carl Linnaeus and why it is important.</p> <p>I can use secondary resources to find out how microorganisms can be helpful and harmful.</p> <p>I can use secondary sources to research unusual animals and decide where they belong in the classification system e.g. kangaroos, platypus and axolotl.</p>	<p>Vertebrates, fish, amphibian, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering</p>
Biology - Animals, including humans		
Knowledge	Scientific skills - Testing	Scientific skills - Identification

<p>I know and can name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>I know that diet, exercise, drugs and lifestyle impact on the way their bodies function.</p> <p>I know the ways in which nutrients and water are transported within animals, including humans.</p>	<p>I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>I can carry out a fair test and explore the effects of different activities on my pulse rate.</p> <p>I can use test results to make predictions to set up further comparative and fair tests.</p>	
<p>Scientific skills - Observation</p>	<p>Scientific skills - Research</p>	<p>Vocabulary</p>
<p>I can observe over time how long it takes for my pulse rate to return to my resting pulse rate (recovery rate).</p> <p>I can record data and results using tables, scatter graphs, bar and line graphs.</p> <p>I can observe pulse rates before, during and after exercise, and measure pulse rate accurately using scientific equipment.</p> <p>I can explore recovery rate and look for patterns between different groups of people.</p> <p>I can explore resting pulse rates and look for patterns between different groups of people.</p>	<p>I can use secondary sources to research the negative effects of drugs (e.g. tobacco).</p> <p>I can use secondary sources (research or an expert) to find out about the benefits of a healthy diet and regular exercise.</p> <p>I can present information in oral and written forms e.g. a health leaflet or a job description for the heart</p> <p>I can use secondary research to answer my own questions about the circulatory system.</p>	<p>Heart, pulse, rate, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle</p>
<p>Biology - Evolution and inheritance</p>		
<p>Knowledge</p>	<p>Scientific skills - Testing</p>	<p>Scientific skills - Identification</p>
<p>I know that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</p> <p>I know that living things reproduce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>I know how animals and plants are adapted to suit their environment in different ways.</p> <p>I know that adaptation may lead to evolution and can explain the process of evolution.</p>	<p>I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p>	<p>I can identify characteristics that will make a plant or animal suited or not suited to a particular habitat.</p> <p>I can compare how some living things are adapted to survive in extreme conditions for example cactuses, penguins and camels.</p>
<p>Scientific skills - Observation</p>	<p>Scientific skills - Research</p>	<p>Vocabulary</p>

<p>I can make observations of fossils to identify living things that lived on Earth millions of years ago.</p> <p>I can use fossil evidence to support the theory of evolution.</p> <p>I can use different equipment to look for patterns linking the suitability of bird beaks for the food available (Darwin)</p> <p>I can observe local animals and raise questions about how they are adapted to their environment.</p>	<p>I can use secondary sources to find out about how the population of peppered moths changed during the industrial revolution.</p> <p>I can use secondary research to compare the ideas of Charles Darwin and Alfred Wallace on evolution.</p> <p>I can use secondary sources to research the work of palaeontologists such as Mary Anning and how her work provided evidence of evolution.</p> <p>I can use secondary sources to research different types of species and their characteristics making them suitable for different habitats.</p>	<p>Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils</p>
<p>Physics - Light</p>		
<p>Knowledge</p>	<p>Scientific skills - Testing</p>	<p>Scientific skills - Identification</p>
<p>I know that light appears to travel in straight lines.</p> <p>I know that light travels in straight lines and use this to explain that objects are seen because they give out or reflect light into the eye.</p> <p>I know that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.</p> <p>I know that light travels in straight lines and use this to explain why shadows have the same shape as the object that cast them.</p>	<p>I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>I can take measurements using a range of scientific equipment (e.g. lux meters, tape measures and data loggers) with increasing accuracy and precision, taking repeat readings where appropriate.</p>	
<p>Scientific skills - Observation</p>	<p>Scientific skills - Research</p>	<p>Vocabulary</p>
<p>I can use scientific diagrams and labels or models to describe how light travels in a straight line either from sources or reflected from other objects to our eyes.</p> <p>I can use scientific diagrams and labels or models to describe how light travels in straight lines past translucent or opaque objects to form a shadow of the same shape.</p>	<p>I can use secondary sources to find out how the path of light rays can be directed by reflection to be seen e.g. periscope and rear view mirrors.</p>	<p>As for Year 3 Light Unit plus straight lines, light rays</p>

<p>I can observe how the shape and size of shadow can be varied.</p> <p>I can predict and explain with diagrams or models, how the path of light rays can be directed by reflection to be seen e.g. periscope and rear-view mirrors.</p>		
Physics - Electricity		
Knowledge	Scientific skills - Testing	Scientific skills - Identification
<p>I know that the brightness of a lamp or the volume of a buzzer changes with the number and voltage of cells used in the circuit.</p> <p>I know that there are variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</p> <p>I know that recognised symbols can be used when representing a simple circuit in a diagram.</p>	<p>I can plan different types of scientific enquiry to answer questions, including recognising and controlling variables where necessary.</p> <p>I can investigate the effect of adding (more bulbs, more cells, more buzzers, more motors) to a circuit.</p> <p>I can investigate how the brightness of bulbs and volume of buzzers can be changed by increasing or decreasing the number of cells in a circuit.</p>	<p>I can compare and give reasons for variations in how components function.</p>
Scientific skills - Observation	Scientific skills - Research	Vocabulary
<p>I can take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate (e.g. use of lux meter to measure brightness of a bulb).</p> <p>I can record data and results of increasing complexity using scientific diagrams and labels, and tables.</p>	<p>I can use secondary sources to find out how our ideas of electricity have changed over time.</p> <p>I can use secondary sources to find out how electricity has impacted the lives of humans over time.</p>	<p>Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage</p> <p>N.B children do not need to understand what voltage is, but will use volts and voltage to describe the different batteries.</p> <p>The words 'cells' and 'batteries' are not used interchangeably.</p>