William Tyndale Primary School

Science Curriculum Overview 2023 - 2024

Our goal for Science education is that children become scientifically literate citizens who understand the world around them, by developing:

- **the ability to ask meaningful questions based on their experiences;**
- **the use of scientific enquiry skills; and**
- **enjoyment of exploring, discovering and creating meaningful connections with the world.**

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Right of the month	*September: Article 28 – the right to learn and go to school* *October: Article 12 – the right to be listened to*	*November: Article 19 – the right not to be harmed and to be looked after and kept safe* *December: Article 13 – the right to follow your own religion*	*January: Article 29 – the right to become the best you can be* *February: Article 42 – the right to learn about your rights*	*March: Article 7 – the right to a name and a nationality* *April: Article 24 – the right to food, water and medical care*	*April: Article 24 – the right to food, water and medical care* *May: Article 20 – the right to practice your own culture, language and religion*	*June: Article 22 – the right to special protection and help if you are a refugee* *July: Article 31 – the right to play and rest*
Skills Builder	*September: Listening* *October: Speaking*	*November: Teamwork* *December: GLOBAL GOALS*	*January: Problem Solving* *February: Staying Positive*	*March: Creativity* *April: GLOBAL GOALS*	*April: GLOBAL GOALS* *May: Aiming High*	*June: Leadership* *July: GLOBAL GOALS*
Whole school days/ events linked to Science			*RSPB Big Birdwatch*	*British Science Week* *London Flower Society Spring Bulbs Competition*	*Outdoor classroom day* *National Gardening Week*	*Great Science Share*
Nursery	Humans	Seasonal Changes; Living Things & Their Habitats	Forces, Electricity	Animals excluding Humans, Living Things and their Habitats	Living things and their habitats Plants	Seasonal Changes, Humans
Reception	Seasonal Changes, Humans, Sound	Seasonal Changes, Earth and Space	Seasonal Changes, Light, Materials	Seasonal Changes, Living things and their habitats	Seasonal Changes, Animals excluding Humans	Forces
Year 1	**Seasonal Change: all year**					
	Animals including humans		Everyday Materials		Plants	

Year 2	Animals including humans	Living things and their habitats	Uses of Everyday Materials		Plants	SRE
Year 3	Rocks	Animals including humans	Forces and Magnets	Plants	Light	
Year 4	States of Matter	Animals including humans	Sound	Electricity *Torches*	Living things and their habitats	SRE
Year 5	Earth and Space	Living things and their habitats	Properties and changes of materials		Animals including humans (Recap SRE)	Forces *STEM Project: Chain Reaction*
Year 6	Living things and their habitats	Animals including humans	SRE	Evolution and Inheritance	Electricity	Light

Science Knowledge and Skills Progression 2023 - 2024

Our goal for Science education is that children become scientifically literate citizens who question and understand the world around them, through developing:

- **deep knowledge and experiences;**
- **their scientific enquiry skills; and**
- **an enjoyment of exploring, discovering and creating meaningful connections with the world.**

Working Scientifically Progression Summary

	Asking Questions 	Setting up Tests 	Observing and Measuring 	Recording Data 	Interpreting and communicating results 	Evaluating 
EYFS	**Listen attentively and respond to what they hear with relevant questions** Show curiosity and ask questions	**Show an ability to follow instructions involving several ideas or actions** **Be confident to try new activities** **Use a range of small tools** **Safely use and explore a variety of materials, tools and techniques**	**Explore the natural world around them, making observations and drawing pictures of animals and plants** Make observations using their senses and simple equipment Use equipment to measure Make direct comparisons	**Record their observations by drawing, taking photographs, using sorting rings or boxes and, in Reception, on simple tick sheets** **Identify, sort and group**	**Participate in discussions, offering their own ideas, using recently introduced vocabulary** **Express their ideas and feelings about their experiences** **Know some similarities and differences, drawing on their experiences** Use their observations to help them to answer their questions	**Offer explanations for why things might happen** Talk about what they are doing and have found out

Years 1 and 2	**Ask simple questions and recognise that they can be answered in different ways** • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.	**Perform simple tests** • The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time.	**Observe closely using simple equipment** • Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. • They begin to take measurements, initially by comparisons, then using non-standard units. **Identifying and classifying** • Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living	**Gather and record data to help in answering questions** • The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. • They classify using simple prepared tables and sorting rings.	**Use appropriate scientific language to communicate ideas**	**Use their observations and ideas to suggest answers to questions** • Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources. • The children recognise 'biggest and smallest', 'best and worst' etc. from their data.

			things. They describe the characteristics they used to identify a living thing.			
Years 3 and 4	**Ask relevant questions and use different types of scientific enquiries to answer them.** • The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. • The children answer questions posed by the teacher. • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	**Set up simple practical enquiries, comparative and fair tests.** • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. **Explanatory note:** A *comparative test* is performed by changing a variable that is *qualitative* e.g. the type of material, shape of the parachute. This leads to a ranked outcome. A *fair test* is performed by changing a variable that is *quantitative* e.g. the thickness of the material or the area of the canopy. This leads to	**Make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers** • The children make systematic and careful observations. • They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements**.**	**Gather, record, classify and present data in a variety of ways to help answer questions** **Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.** • The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams. • Children are supported to present	**Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions** • They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary. **Identify differences, similarities or changes related to simple scientific ideas and processes** • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships.	**Using results to draw simple conclusions, make predictions for new values, suggest improvements, and raise further questions** • Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface. • Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry. • They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry. **Using straight forward scientific evidence to answer questions or to support their findings**

		establishing a causative relationship.		the same data in different ways in order to help with answering the question.		• Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence.
Years 5 and 6	**Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.** • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources	**Use test results to make predictions to set up further comparative and fair tests.** • Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.	**Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency	**Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g.	**Report and present findings from enquiries, including conclusions and causal relationships in oral and written forms such as displays and other presentations** • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge. • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of	**Identify and evaluate scientific evidence that has been used to support or refute ideas or arguments.** • Children answer their own and others' questions based on observations they have made measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding supports or refutes their answer. • They talk about how their scientific ideas

	can be used to answer questions that cannot be answered through practical work. • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.		(observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).	using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.	measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data. • They communicate their findings to an audience using relevant scientific language and illustrations.	change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding.

Knowledge and skills progression Nursery – Year 6

Nursery: Understanding the World

PLAN EYFS Matrices

Topic	Knowledge/Understanding	Evidence of Learning
All About Me (Humans)	To know some of the things that make them unique, and talk about some of the similarities and differences in relation to friends or family.	Children can talk about their families, fun, plans, holidays etc. Begin to compare their own features to others- hair, eyes, skin etc. Can discuss different languages spoken in class. Compare baby photos to now and discuss changes.
Key Vocabulary	**Routine/passing of time** – *then, now, before, next, soon, line up, carpet time, lunchtime, fruit time* **Family** – *mother, father, grandma, grandpa, brother, sister, cousin, older, younger, youngest*	
Woodland (Seasonal changes; Living things and their habitats; Plants)	To explore the natural world around them and begin to understand the need to respect and care for the natural environment and all living things. Can talk about the features of some minibeasts	Observe decay and leaves changing. Monitor changing leaves on the playground tree. Discuss properties of natural collections. Exploring outside and autumn collections [bark, leaves, seeds, twigs]. Can talk about some of the things they have observed such as plants, animals, natural and found objects. Shows care and concern for living things and the environment. Observe and compare features of plants. Outdoor learning opportunity - link to Art objective: Explore different materials freely, in order to develop their ideas about how to use them and what to make.
Key vocabulary	**Minibeasts**- habitat, environment, insects, millipede, beetle, spider, worm, ladybird, bee, fly, dragonfly, woodlouse, dark, damp, soil, slithers, wiggles, crawls, flies, patterns, antennae, legs, wings	
People who help us (Forces; Electricity)	To begin to ask questions about their local environment.	Discussion of a variety of jobs through visitors and visits to different workplaces, such as the fire station and post box, images of builders and through play of different work scenes. Exploring fire engine routes on the play road map and posting cards through a post box. Observing the mechanical parts of vehicles, exploring wheels, chains, levers and cogs. Using a range of toys with pulleys, flap, buttons and dials (e.g. role-play kitchen, toy camera, telephone, till, microwave oven etc)

		Children are able to notice electrical equipment in their environment and show an interest eg plugs/batteries/bee bots Children role play using electrical equipment and talk about their experiences at home.
Key vocabulary	**People who help us**- nurse, mechanic, builder, paramedic, postal worker, building supervisor, bus driver, doctor, teacher, librarian, vet, police officer, firefighter, surgeon, dentist, taxi driver, scientist	
Wild Animals (Animals excluding humans; Living things & their habitats)	Know that different animals live in different environments and begin to understand why particular habitats help the animals to live. Begin to understand the resources that animals need to survive.	Observe animals in videos and images. Create play scenes to represent environments.
Key vocabulary	**UTW -** seasons, change, growth	
In the Garden (Living things & their habitats; Plants)	Can talk about some of the things they have observed such as plants, animals, natural and found objects. Can talk about the features of some minibeasts	Plant, look after and grow vegetables and flowers. Observe and compare features of a plant. Search outside for minibeasts Outdoor learning opportunity- link to Art objective: Draw with increasing complexity and detail.
Key vocabulary	**Animals and environments** – polar, desert, jungle, rainforest, savannah, forest, dry, wet, humid, lush, lion, snake, camel, tiger, elephant, features, eyes, hump, tail, claws, whiskers, teeth, scales.	
Growth and Change (Seasonal changes; Humans)	Understanding changes in each season. Understanding changes in humans.	Discuss the changes observed in each season. Continue to watch plants grow and change in the outside area. Look at photos of children and staff as babies. How have we changed? Compare toys/clothes/beds/chairs they used as babies with now. Think about key events/activities throughout the year in Nursery and order in sequence. What did we do/learn?
Key vocabulary	**Plants-** roots, stem, leaves, flowers **Minibeasts**- habitat, environment, insects, millipede, beetle, spider, worm, ladybird, bee, fly, dragonfly, woodlouse, dark, damp, soil, slithers, wiggles, crawls, flies, patterns, antennae, legs, wings	

Reception: Understanding the World

Topic	Knowledge/Understanding	Evidence of Learning
Marvellous Me (Seasonal changes; Humans; Sound)	There are four seasons and changes that occur during the year. The weather becomes cooler and leaves change colour in autumn.	Learning to observe and describe the classroom and school and the natural world around us, asking questions such as how can we describe the weather and what are seasons? Children can spot signs of autumn, collecting leaves, conkers and acorns, leaf rubbings, finger and hand painting pictures of autumnal signs, creating collages using leaves, taking photos of what they see.
	Humans have similarities and differences; this is what makes us special. We need to look after our bodies and some people help us to do that eg dentists, nurses.	Children learn to observe and talk about people they know. They describe them by looking carefully and using a growing bank of scientific vocabulary. They notice similarities and differences' Children can look at photographs of different people / friends and describe them They can describe characters in book and compare them to themselves When using mirrors to draw self portraits, they can talk about what makes them 'me' They can compare handprints and footprints of friends/themselves They might begin to sort or groups by characteristics eg these all have brown hair / eyes /
	Sound is all around us and is made by different sources. It can be different and we use a range of words to describe it.	Children learn to describe what they see and hear when exploring their environment. During their work on humans they describe the part of their bodies used to hear sound. They can talk about sounds they hear in their environment with a growing range of vocabulary They can identify what is making a sound They ask questions about sounds they can hear.
Key Vocabulary	**Positional language** – behind under inside on top around **Seasons**- Autumn, leaves, conkers, acorns, orange, yellow, red, brown, branch, seeds, fruit, pattern, dry, crumpled **Humans** - hair (black, brown, dark, light, blonde, ginger, grey, white, long, short, straight, curly), eyes (blue, brown, green, grey), skin (black, brown, white), big/tall, small/short, bigger/smaller, baby, toddler, child, adult, old person, old, young, brother, sister, mother, father, aunt, uncle, grandmother, grandfather, cousin, friend, family, boy, girl, man, woman **Sound**: sound, noise, listen, hear, music, voices, bird song, traffic, sirens, thunder, high, low, loud, quiet, soft, volume, crackle, thunder, hum, buzz, roar. Expose children to supplementary vocabulary such as: source, crescendo, vibration, pitch	

Let's Celebrate (Seasonal changes; Humans; Earth & Space)	The seasons can have an effect on the world around us. We can notice this change by observing the plants, weather and animal behaviour and the sky.	Children continue to notice the changing weather in the world around them through the amount of day and night as well as the clothes they wear. They talk about the animal kingdom and how some animals' behaviour changes. Observing and discussing changes in trees/plants/leaves and the effect on the behaviour of animals - hibernation Observing seasonal changes - autumn to winter. Observing and exploring light and dark Asking and exploring questions such as: What is different/the same? What is the weather like? What clothes do we wear? What does the natural world outside look like now? Is it darker outside earlier? Can we see the moon and stars more easily?
	Changes in the sky and daylight hours help us to understand the difference between day and night. It is warmer when the sun shines directly on us.	Children start to talk about how it is dark before they go to bed and when they wake up in the morning. They might talk about the stars they notice at night with their family. When playing outside they notice the change in light when the clouds come and might feel cold and ask to put coats/extra layers on. When playing outside they might notice the moon can sometimes be seen in the day as well as the sun. They talk about things they can do in the light and things they can do in the dark
Key vocabulary	**Recap Autumn**- Autumn, leaves, conkers, acorns, orange, yellow, red, brown, branch, seeds, fruit, pattern, dry, crumpled **Winter-** icicles,igloo, snowflakes, woolly hat, gloves, scarf, jumper, ice, cold, jacket, boots, light, dark **Earth and Space**: Sun, Moon, Earth, star, planet, sky, day, night, space, round, bounce, float Expose children to supplementary vocabulary such as: sunrise, sunset, astronaut, astronomer, constellation, orbit, nocturnal,slow-motion, magnify	

Magic Materials (Seasonal changes; Materials; Light)	Everyday objects can look and feel different. Materials can be changed by humans and nature eg melting ice and cooking.	Children continue to explore their environment using their senses and talking about natural and man made materials e.g. glass in windows, ice/frost,twigs, stones. They begin to notice different materials when making e.g. fabric, card, crayons. They begin to make choices when building or crafting based on properties of materials as well as noting changes. When cooking, they talk about changes they can see eg the butter melted, it turned hard. They talk about and notice changes such as melting ice / snow, the paper got soggy in the rain, They choose materials for a purpose; eg I am using cardboard because it is hard, I put foil on my rocket as it is shiny, waterproof coat for the rain. They can start to talk about and name some properties in their environment eg glass in the windows, metal keys, wooden toys/pencils.
	Shadows can be made when a light source is blocked. Not all shadows are the same and can be different in size and shape.	Children begin to notice shadows when playing outside and may begin to make shadows of their own. When exploring their environment, they might notice areas of their playground that are sunny/shady at different times of the day. They may begin to notice the light source and the object that is making the shadow. They might draw around shadows and talk about sizes. They make shadows using puppets / light sources / put hands in beams of light and make shadows. They talk about shady spots and sunny spots in the garden. When working with an adult they might talk about the difference when clouds cover/uncover the sun.
Key vocabulary	**Material**s :ice, water, frozen, icicle, snow, melt, wet, cold, slippery, smooth, big, bigger, biggest, smaller, smaller, smallest, hard, soft, bendy, rigid, wood, plastic, paper, card, metal, strong, weak, hot, apply heat, waterproof, soggy, not waterproof, best, change, change back. Expose children to supplementary vocabulary such as: solid, liquid, gas, most suited **Light**: Sun, sunny, light, shadow, shady, clouds, torch, see-through, non-see-through, source, light source. Expose children to supplementary vocabulary such as casting a shadow, pale, dark, transparent, opaque	
Sunshine and sunflowers (Seasonal changes; Living things & their habitats; Plants)	Plants look, feel and smell different and need to be cared for. Minibeasts live in the world around us. Plants and animals can have different environments	Children explore their natural habitat and begin to contrast it to another eg farm, park, forest, through real life experiences of books. They notice plants all around them and begin to describe their similarities and differences. They notice minibeasts in their natural environment and understand they need to be cared for and returned to their natural environment if they examine them. Children touch, smell or draw different plants in their environment and talk about what they observe. They might spot plants that are the same in different places. They use a growing vocabulary to describe their experiences such as petal, bush, trees, flowers, herbs. They draw or take photographs of minibeasts in their environment and show curiosity about them. They talk about what is the same or different about habitats that animals live in.

	Understanding the changes from autumn to spring (see autumn) Understanding that animals come out of hibernation.	Children continue to deepen their experience of seasonal change in the natural environment around them. They notice differences to the amount of light, the heat of the sun, the flowers around them and the animal kingdom e.g. bird songs, new farm life and animals coming out of hibernation. These experiences are gained from real life experiences as well as through stories, rhymes and songs. Observational drawing of plants and trees around them. Talking about the leaves and plants they can see and showing curiosity for them. Collecting natural materials to use in their play or going on a scavenger hunt. Noticing and asking questions about the animal kingdom eg bird songs, talking about new farm animals on visits / through stories. Naming and describing familiar animals.
Key vocabulary	**Seasons:** year, weather, change, trees, leaves, plants, animals, grow, thrive, hibernation **Living things and their habitats**: plant, tree, bush, flower, vegetable, herb, weed, animal, names of plants and animals they see, name of a contrasting environment e.g. beach, forest. Expose children to supplementary vocabulary such as: environment	
Wriggle, stomp and crawl (Seasonal changes; Animals excluding humans)	Understanding the changes from spring to summer (see autumn) Animals look, sound and behave differently. They live in different habitats. Animals need to be cared for and protected.	As children move from spring to summer they continue to observe and discuss the changing seasons. They ask questions such as, how has the weather changed? What can we wear? What can we do? What does the natural world around us look like? They observe the trees, plants, flowers, light, air, smells, tastes and incorporate it into their play. They represent their experiences through art or drawing. Children talk about and show interest in a range of different animals. They share their personal experiences from either real life experiences or knowledge gained in books. They begin to understand that different animals live in different places. They can name, draw and talk about a range of animals. They use animal names in their play, build dens or role play caring for animals. They enjoy moving like different animals They might match animals to different habitats or describe where animals like to live.
Key vocabulary	**Seasons**, year, weather, change **Animals excluding humans**: names of animals, live, on land, in water, jungle, desert, North Pole, South Pole, sea, hot, cold, wet, dry, snow, ice. Expose children to supplementary vocabulary such as environment, polar regions, ocean, camouflage’	

Marvellous Machines (Forces)	Children explore the natural world around them, describing the forces they can see, hear and feel.	Through practical experiences, children explore the effect of forces on the world around them and in their play. They test, observe and talk about what they can see. They notice some objects float and some sink and try/test different materials and objects. They build ramps of different heights and talk about what they see. They make adaptations in their play They bounce different objects and notice how much/high they bounce They notice the movement of different materials in the wind and explore and experiment They make and test different aeroplanes and test how far they fly.
Key vocabulary	float, sink, up, down, top, bottom, surface, move, roll, drop, fly, turn, spin,fall, fast, slow, faster, slower, fastest, slowest, further, furthest, wind, air, water, blow, bounce. Expose children to supplementary vocabulary such as force, rotate, solid, liquid, gravity	

Year 1

Y1 Plants

1. identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
2. identify and describe the basic structure of a variety of common flowering plants, including trees

Assessment guidance	**Prior Learning** Plant seeds and care for growing plants. (Nursery – Plants) • Understand the key features of the life cycle of a plant and an animal. (Nursery – Plants) • Begin to understand the need to respect and care for the natural environment and all living things. (Nursery – Plants) • Explore the natural world around them. (Reception – Living things and their habitats) • Recognise some environments that are different to the one in which they live. (Reception – Living things and their habitats)	**Future Learning** • Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants) • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants) • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats) • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants) • Investigate the way in which water is transported within plants. (Y3 - Plants)

<table>
<tr><td>Substantive Knowledge</td><td colspan="2">Key learning
Growing locally there will be a vast array of plants which all have specific names. These can be identified by looking at the key characteristics of the plant. Plants have common parts but they vary between the different types of plants. Some trees keep their leaves all year whilst other trees drop their leaves during autumn and grow them again during spring.

Key vocabulary
Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud
Names of trees in the local area
Names of garden and wild flowering plants in the local area</td><td>Possible Evidence
Can name trees and other plants that they see regularly
Can describe some of the key features of these trees and plants e.g. the shape of the leaves, the colour of the flower/blossom
Can point out trees which lost their leaves and those that kept them the whole year
Can point to and name the parts of a plant, recognising that they are not always the same e.g. leaves and stems may not be green
Outdoor learning opportunity: Observing plant structure. Link to Art objective: Make different kinds of shapes and name primary colours.</td></tr>
<tr><td></td><td colspan="3">Common misconceptions
Some children may think:
• plants are flowering plants grown in pots with coloured petals and leaves and a stem
• trees are not plants
• all leaves are green
• all stems are green
• a trunk is not a stem
• blossom is not a flower.</td></tr>
<tr><td>Working Scientifically Skills</td><td colspan="2">Make close observations of leaves, seeds, flowers etc.
Compare two leaves, seeds, flowers etc.
Classify leaves, seeds, flowers etc. using a range of characteristics
Identify plants by matching them to named images
Make observations of how plants change over a period of time
When further afield, spot plants that are the same as those in the local area studied regularly, describing the key features that helped them</td><td>Can sort and group parts of plants using similarities and differences
Can use simple charts etc. to identify plants
Can collect information on features that change during the year
Can use photographs to talk about how plants change over time
Outdoor learning opportunity- link to Art objective: Sort and arrange materials.</td></tr>
<tr><td>Cross-curricular links</td><td>UNCRC or Global Goals
Article 13: Freedom of expression
Article 24: Good health and health services
Article 28: Right to education
Article 31: Leisure, play and culture
Global Goal 3: Good health and well-being
Global Goal 4: Quality Education</td><td>British Values
Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)</td><td>Cultural Capital: Skills builder and trip/visitor opportunities

Workshop with the Garden Classroom
Visit to Islington Ecology Centre</td></tr>
<tr><td colspan="4">Career Links

Park ranger: maintains parks. Farmer: grows crops and raises animals for food. Gardener: creates and maintains gardens and green spaces. Tree surgeon: plants, maintains and manages trees. Forester: works to deliver wood products to the market.</td></tr>
</table>

Y1 Animals, including humans

1. identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
2. identify and name a variety of common animals that are carnivores, herbivores and omnivores
3. describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
4. identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense

Assessment guidance	**Prior Learning** • Use all their senses in hands-on exploration of natural materials. (Nursery - Humans) • Name and describe people who are familiar to them. (Reception - Humans)	**Future Learning** • Describe 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. (Y2 - Living things and their habitats) • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)
Substantive Knowledge	**Key learning** Animals vary in many ways having different structures e.g. wings, tails, ears etc. They also have different skin coverings e.g. scales, feathers, hair. These key features can be used to identify them. Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals. Humans have key parts in common, but these vary from person to person. Humans (and other animals) find out about the world using their senses. Humans have five senses – sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body. **Key vocabulary** Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales,feathers, fur, beak, paws, hooves, names of animals experienced first-hand from each vertebrate group, parts of the body including those within the school's RSE policy, senses, touch, see, smell, taste, hear, fingers, skin, eyes, nose, ear, tongue **N.B.** The children need to be able to name and identify a range of animals in each group e.g. name specific birds and fish. They do not need to use the terms mammal, reptiles etc. or know the key characteristics of each,	**Possible Evidence** ● Can name a range of animals which includes animals from each of the ● vertebrate groups ● Can describe the key features of these named animals ● Can label key features on a picture/diagram ● Can write descriptively about an animal ● Can write a What am I? riddle about an animal ● Can describe what a range of animals eat ● Can play and lead 'Simon says' ● During PE lessons, can follow instructions involving parts of the body ● Can label parts of the body on pictures and diagrams ● Can explore objects using different senses

	although they will probably be able to identify birds and fish, based on their characteristics. The children also do not need to use the words carnivore, herbivore and omnivore. If they do, ensure that they understand that carnivores eat other animals, not just meat. Although we often use our fingers and hands to feel objects, the children should understand that we can feel with many parts of our body.		
	Common Misconceptions Some children may think: • only four-legged mammals, such as pets, are animals • humans are not animals • insects are not animals • all 'bugs' or 'creepy crawlies', such as spiders, are part of the insect group • amphibians and reptiles are the same.		
Working Scientifically Skills	• Make first-hand, close observations of animals from each of the groups. • Compare two animals from the same or different groups. • Classify animals using a range of features. • Identify animals by matching them to named images. • Classify animals according to what they eat. • Make first-hand close observations of parts of the body e.g. hands, eyes. • Compare two people. • Take measurements of parts of their body. • Compare parts of their own body. • Look for patterns between people e.g. Do people with big hands have big feet? • Classify people according to their features. • Investigate human senses e.g. Which part of my body is good for feeling, which is not? Which food/flavours can I identify by taste? Which smells can I match?		• Can sort and group animals using similarities and differences • Can use simple charts etc. to identify unknown animals • Can create a drawing of an imaginary animal labelling its key features • Can use secondary resources to find out what animals eat, including talking to experts e.g. pet owners, zookeepers etc. • Can use first-hand close observations to make detailed drawings • Can name body parts correctly when talking about measurements and comparisons e.g. "My arm is x straws long." "My arm is x straws long and my leg is y straws long. My leg is longer than my arm." "We both have hands, but his are bigger than mine." "These people have brown eyes and these have blue." • Can talk about their findings from investigations using appropriate vocabulary e.g. "My fingers are much better at feeling than my toes" "We found that the crisps all taste the same."
Cross- curricular links	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Farm visit or zoo
Career Links **Conservationist**: works for the protection and preservation of living things and the environment. **Farmer**: grows crops and raises animals for food. **Marine biologist**: studies living things in oceans. **Mammologist**: studies mammals. **Naturalist**: scientist who studies the natural world. **Vet**: looks after unwell animals. **Wildlife filmmaker**:			

creates films and documentaries about wildlife. **Wildlife photographer**: takes pictures of animal. **Doctor:** works to keep people healthy and cure disease. **Medical illustrator:** makes pictures that help people to understand more about how the body works and what happens when people are ill. **Nurse:** plan and provide medical and nursing care to patients in hospital, at home or in other places. **Optician:** a doctor specialising in vision and eye health.

Y1 Everyday materials

1. distinguish between an object and the material from which it is made
2. identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
3. describe the simple physical properties of a variety of everyday materials
4. compare and group together a variety of everyday materials on the basis of their simple physical properties

<table>
<tr><td>Assessment guidance</td><td>Prior Learning
• Use all their senses in hands-on exploration of natural materials. (Nursery - Materials, including changing materials)
• Explore collections of materials with similar and/or different properties. (Nursery - Materials, including changing materials)
• Talk about the differences between materials and changes they notice. (Nursery - Materials, including changing materials)</td><td>Future Learning
• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)
• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)</td></tr>
<tr><td>Substantive Knowledge</td><td>Key Learning
All objects are made of one or more materials. Some objects can be made from different materials e.g. plastic, metal or wooden spoons. Materials can be described by their properties e.g. shiny, stretchy, rough etc. Some materials e.g. plastic can be in different forms with very different properties.
Key vocabulary
Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through</td><td>Possible Evidence
Can label a picture or diagram of an object made from different materials
Can describe the properties of different materials</td></tr>
<tr><td></td><td colspan="2">Common Misconceptions

Some children may think:
• only fabrics are materials
• only building materials are materials
• only writing materials are materials
• the word ‘rock’ describes an object rather than a material
• ‘solid’ is another word for hard.</td></tr>
</table>

Working Scientifically Skills	**Classify objects** made of one material in different ways e.g. a group of object made of metal **Classify in different** ways one type of object made from a range of materials e.g. a collection of spoons made of different materials **Classify materials** based on their properties **Test the properties of objects** e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness of shelters		Can **sort objects and materials** using a range of properties Can choose an appropriate method for **testing** an object for a particular property Can use their **test evidence to answer the questions** about properties e.g. Which cloth is the most absorbent? **STEM PROJECT: Design and build a windmill** Outdoor learning opportunity: Test floating objects. Link to art objective- sort different materials.
Cross- curricular links EE, DT	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities**
Career Links: Architect: uses art and science to design buildings that are strong. **Builder:** builds structures.**Materials scientist:** researches structures and properties of materials.			

Y1 Seasonal Changes

1. observe changes across the four seasons
2. observe and describe weather associated with the seasons and how day length varies

Assessment guidance	**Prior learning** • Understand the key features of the life cycle of a plant and an animal. (Nursery – Plants & Animals, excluding humans) • Explore the natural world around them. (Reception – Seasonal changes) • Describe what they see, hear and feel whilst outside. (Reception – Seasonal changes) • Understand the effect of changing seasons on the natural world around them. (Reception – Seasonal changes)	**Future Learning** • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 - Earth and space) • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3)

<table>
<tr><td>Substantive Knowledge</td><td colspan="2">Key learning
In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again.
The weather also changes with the seasons. In the UK, it is usually colder and rainier in Winter and hotter and dryer in the Summer. The change in weather causes many other changes; some examples are numbers of minibeasts found outside, seed and plant growth, leaves on trees and type of clothes worn by people.
Key vocabulary
Weather (sunny, rainy, windy, snowy etc.), seasons (Winter, Summer, Spring, Autumn), sun, sunrise, sunset, day length</td><td>Possible Evidence
Can name the four seasons and identify when in the year they occur.
Can describe weather in different seasons over a year.
Can describe days as being longer (in time) in the summer and shorter in the winter.
Can describe other features that change through the year</td></tr>
<tr><td></td><td colspan="3">Common Misconceptions
Some children may think:
• it always snows in winter
• it is always sunny in the summer
• there are only flowers in spring and summer
• it rains most in the winter.</td></tr>
<tr><td>Working Scientifically Skills</td><td colspan="2">Collect information about the weather regularly throughout the year
Present this information in table and charts to compare the weather across the seasons
Collect information, regularly throughout the year, of features that change with the seasons e.g. plants, animals, humans
Present this information in different ways to compare the seasons
Gather data about day length regularly throughout the year and present this to compare the seasons</td><td>Use their evidence gathered to describe the general types of weather and changes in day length over the seasons.
Use their evidence to describe some other features of their surroundings, themselves, animals, plants that change over the seasons
Demonstrate their knowledge in different ways e.g. making a weather forecast video, writing seasonal poetry, creating seasonal artwork
Outdoor learning opportunity- link to Art objectives: sort and arrange materials and draw lines of different sizes and thickness.</td></tr>
<tr><td>Cross- curricular links</td><td>UNCRC or Global Goals
Article 13: Freedom of expression
Article 24: Good health and health services
Article 28: Right to education
Article 31: Leisure, play and culture
Global Goal 3: Good health and well-being
Global Goal 4: Quality Education</td><td>British Values
Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)</td><td>Cultural Capital: Skills builder and trip/visitor opportunities

Workshop with the Garden Classroom
Visit to Islington Ecology Centre</td></tr>
<tr><td colspan="4">Career Links: Climatologist: studies climate patterns. Horticulturist: an expert in garden cultivation and management. Meteorologist: studies and predicts the weather. They collect data about the atmosphere from weather stations and satellites. Park ranger: maintains parks</td></tr>
</table>

Year 2

Y2 Living things and their habitats

1. explore and compare the differences between things that are living, dead, and things that have never been alive
2. identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
3. identify and name a variety of plants and animals in their habitats, including micro-habitats
4. describe 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

Assessment guidance	**Prior learning** • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)	**Future Learning** • Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats) • Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)
Substantive Knowledge	**Key learning** All objects are either living, dead or have never been alive. Living things are plants (including seeds) and animals. Dead things include dead animals and plants and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair and feathers (this is a simplification but appropriate for year 2 children). An object made of wood is classed as dead. Objects made of rock, metal and plastic have never been alive (again ignoring that plastics are made of fossil fuels). Animals and plants live in a habitat to which they are suited which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well. The habitat provides the basic needs of the animals and plants – shelter, food and water. Within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats have different conditions e.g. light or dark, damp or dry. These conditions affect what plants and animals live there. The plants and animals in a habitat	**Possible Evidence** Can find a range of items outside that are living, dead and never lived Can name a range of animals and plants that live in a habitat and micro-habitats that they have studied Can talk about how the features of these animals and plants make them suitable to the habitat Can talk about what the animals eat in a habitat and how the plants provide shelter for them Can construct a food chain that starts with a plant and has the arrows pointing in the correct direction Outdoor learning opportunity- Explore natural habitat and surveying of habitats. Link to Art objective: collect visual information

	depend on each other for food and shelter etc. The way that animals obtain their food from plants and other animals can be shown in a food chain. **Key vocabulary:** Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, names of local habitats e.g. pond, woodland etc., names of micro-habitats e.g. under logs, in bushes etc.		
	Common Misconceptions Some children may think: • an animal's habitat is like its 'home' • plants and seeds are not alive as they cannot be seen to move • fire is living • arrows in a food chain mean 'eats'.		
Working Scientifically SKills	**Explore** the outside environment regularly to find objects that are living, dead and have never lived **Classify** objects found in the local environment **Observe** animals and plants carefully, **drawing and labelling diagrams** Create simple food chains for a familiar local habitat from **first hand observation and research** Create simple **food chains from information given** e.g. in picture books (Gruffalo etc.)		Can **sort** into living, dead and never lived Can give key features that mean the animal or plant is suited to its micro-habitat Using a food chain can **explain** what animals eat Can **explain** in simple terms why an animal or plant is suited to a habitat e.g. the caterpillar cannot live under the soil like a worm as it needs fresh leaves to eat; the seaweed we found on the beach cannot live in our pond because it is not salty
Cross- curricular links **ICT:** taking photographs **Maths:** Venn Diagrams **Literacy:** report writing, meerkat mail	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital:** Skills builder and trip/visitor opportunities Visit to Islington Ecology Centre

Y2 Plants

1. observe and describe how seeds and bulbs grow into mature plants
2. find out and describe how plants need water, light and a suitable temperature to grow and stay healthy

Assessment guidance	**Prior learning**	**Future Learning**
	• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)	• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants)

			• Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. (Y3 - Plants) • Investigate the way in which water is transported within plants. (Y3 -Plants) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)
Substantive Knowledge	**Key learning** Plants may grow from either seeds or bulbs. These then germinate and grow into seedlings which then continue to grow into mature plants. These mature plants may have flowers which then develop into seeds, berries, fruits etc. Seeds and bulbs need to be planted outside at particular times of the year and they will germinate and grow at different rates. Some plants are better suited to growing in full sun and some grow better in partial or full shade. Plants also need different amounts of water and space to grow well and stay healthy. **Key vocabulary** As for year 1 plus - light, shade, sun, warm, cool, water, grow, healthy		**Possible Evidence** Can describe how plants that they have grown from seeds and bulbs have developed over time Can identify plants that grew well in different conditions
	Common Misconceptions Some children may think: • plants are not alive as they cannot be seen to move • seeds are not alive • all plants start out as seeds • seeds and bulbs need sunlight to germinate.		
Working Scientifically Skills	Make **close observations** of seeds and bulbs **Classify** seeds and bulbs **Research and plan** when and how to plant a range of seeds and bulbs Look after the plants as they grow – weeding, thinning, watering etc. Make **close observations and measurements** of their plants growing from seeds and bulbs Make **comparisons** between plants as they grow		Can spot **similarities and difference** between bulbs and seeds Can nurture seeds and bulbs into mature plants identifying the different requirements of different plants Outdoor learning opportunity- link to Art objectives : Create different tones by using coloured pencils and collect visual information
Cross- curricular links	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Workshop with the Garden Classroom Visit to Islington Ecology Centre

Career Links **Climatologist:** studies climate patterns. **Horticulturist:** an expert in garden cultivation and management. **Meteorologist:** studies and predicts the weather. They collect data about the atmosphere from weather stations and satellites. **Park ranger:** maintains parks			

Y2 Animals including humans

1. notice that animals, including humans, have offspring which grow into adults
2. find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
3. describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

Assessment guidance	**Prior learning** • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)	**Future Learning** • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans) • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)
Substantive Knowledge	**Key learning** Animals including humans have offspring which grow into adults. In humans and some animals these offspring will be young, such as babies or kittens, that grow into adults. In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults. The young of some animals do not look like their parents e.g. tadpoles. All animals including humans have basic needs of feeding, drinking and breathing that must be satisfied in order to survive, and to grow into healthy adults they also need the right amounts and types of food and exercise. Good hygiene is also important in preventing infections and illnesses. **Key vocabulary:**	**Possible Evidence** Can describe how animals including humans have offspring which grow into adults, using the appropriate names for the stages Can state the basic needs of animals, including humans, for survival. Can state the importance for humans of exercise, eating the right amounts of different types of food and hygiene. Can name foods in each section of the Eatwell guide

	Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta)		
	Common Misconceptions Some children may think: • an animal's habitat is like its 'home' • all animals that live in the sea are fish • respiration is breathing • breathing is respiration.		
Working Scientifically Skills	Ask **people questions** and use **secondary sources** to find out about the life cycles of some animals **Observe** animals growing over a period of time e.g. chicks, caterpillars, a baby **Ask questions** of a parent about how they look after their baby **Ask pet owners questions** about how they look after their pet **Explore** the effect of exercise on their bodies **Classify** food in a range of ways, including using the Eatwell guide **Investigate** washing hands, using glitter gel		Can **describe**, including using diagrams, the life cycle of some animals, including humans, and their growth to adults e.g. by creating a life cycle book for a younger child Can **measure/observe** how animals, including humans, grow. Show what they know about looking after a baby/animal by creating a parenting/pet owners' guide **Explain** how development and health might be affected by differing conditions and needs being met/not met.
Cross- curricular links **PE:** exercise **PSHE:** Healthy eating and diet, Zones of regulation **SRE:** everybody needs caring for	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Working in a team Nutritionist, Doctor, Nurse, Personal Trainer, Spaceman Visit from a doctor/nurse
Career Links **Conservationist**: works for the protection and preservation of living things and the environment. **Farmer**: grows crops and raises animals for food. **Marine biologist**: studies living things in oceans. **Mammologist**: studies mammals. **Naturalist**: scientist who studies the natural world. **Vet**: looks after unwell animals. **Wildlife filmmaker**: creates films and documentaries about wildlife. **Wildlife photographer**: takes pictures of animal			

Y2 Uses of everyday materials

1. identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
2. find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

Assessment guidance	**Prior learning** • Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)	**Future Learning** • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks) • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets) • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials) • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials)
Substantive Knowledge	**Key learning** All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water. When choosing what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities. A material can be suitable for different purposes and an object can be made of different materials. Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness. **Key vocabulary** Names of materials – increased range from year 1 Properties of materials - as for year 1 plus opaque, transparent and translucent, reflective, non-reflective, flexible, rigid Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing. Bend/bending, stretch/stretching	**Possible Evidence** Can name an object, say what material it is made from, identify its properties and make a link between the properties and a particular use Can label a picture or diagram of an object made from different materials For a given object can identify what properties a suitable material needs to have Whilst changing the shape of an object can describe the action used Can use the words flexible and/or stretchy to describe materials that can be changed in shape and stiff and/or rigid for those that cannot Can recognise that a material may come in different forms which have different properties
	Common Misconceptions Some children may think: • only fabrics are materials • only building materials are materials • only writing materials are materials • the word rock describes an object rather than a material • solid is another word for hard.	

Working Scientifically Skills	**Classify materials** Make suggestions about alternative materials for a purpose that are both suitable and unsuitable **Test the properties** of materials for particular uses e.g. compare the stretchiness of fabrics to select the most appropriate for Elastigirl's costume, test materials for waterproofness to select the most appropriate for a rain hat		**Can sort materials** using a range of properties **Can explain** using the key properties why a material is suitable or not suitable for a purpose Can begin to choose an appropriate method for **testing a material** for a particular property Can use their test evidence to select appropriate material for a purpose e.g. Which material is the best for a rain hat? **STEM PROJECT: Primary Engineer Shoebox Buggy** Outdoor learning opportunity- Constructing a boat. Testing waterproof materials. Link to art objective: sorting materials.
Cross- curricular links **History:** Charles McIntosh timeline	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Science Museum visit
Career Links **Architect:** uses art and science to design buildings that are strong. **Builder:** builds structures. **Materials scientist:** researches structures and properties of materials. **Mechanical engineer:** design and manufacture mechanical systems.			

Year 3

Y3 Plants

1. identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
2. explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
3. investigate the way in which water is transported within plants
4. explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

Assessment guidance	**Prior learning** • Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants) • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants)	**Future learning** • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)
Substantive Knowledge	**Key learning** Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce the plant's food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth **Key vocabulary** Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal – wind dispersal, animal dispersal, water dispersal	**Possible Evidence** Can explain the function of the parts of a flowering plant Can describe the life cycle of flowering plants, including pollination, seed formation, seed dispersal, and germination Can give different methods of pollination and seed dispersal, including examples Outdoor learning opportunity- gather materials to dissect parts of a plant.
	Common Misconceptions Some children may think: • plants eat food • food comes from the soil via the roots • flowers are merely decorative rather than a vital part of the life cycle in reproduction • plants only need sunlight to keep them warm • roots suck in water which is then sucked up the stem.	
Working Scientifically Skills	**Observe** what happens to plants over time when the leaves or roots are removed **Observe** the effect of putting cut white carnations or celery in coloured water **Investigate** 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 amount of space Spot flowers, seeds, berries and fruits outside throughout the year **Observe flowers carefully** to identify the pollen **Observe flowers** being visited by pollinators e.g. bees and butterflies in the summer **Observe seeds** being blown from the trees e.g. sycamore seeds **Research** different types of seed dispersal **Classify** seeds in a range of ways including by how they are dispersed Create a new species of flowering plant	Can **explain observations** made during **investigations** Can look at the features of seeds to decide on their method of dispersal Can draw and label a diagram of their created flowering plant to show its parts, their role and the method of pollination and seed dispersal Outdoor learning opportunity: Link to art objectives: use sketches to annotate and produce a final piece of work.

Cross- curricular links	UNCRC or Global Goals Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	British Values Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	Cultural Capital: Skills builder and trip/visitor opportunities Workshop with the Garden Classroom Visit to Islington Ecology Centre

Career Links

Arborist: cares for and manages trees. **Biochemist:** investigates chemical processes that take place inside living things. **Botanist:** studies plants. **Conservationist:** works for the protection and preservation of living things and the environment. **Dendrologist**: studies woody plants such as trees and aims to protect woodland environments. **Ecologist:** studies interactions between living things and their environments. **Farmer:** grows crops and raises animals for food. **Forester:** works to deliver wood products to the market. **Gardener:** creates and maintains gardens and green spaces. **Horticulturist**: an expert in garden cultivation and management. **Park ranger:** maintains parks. **Plant geneticist:** studies genetics in plants – many work on developing crops to be more robust or provide more nutrition. **Tree surgeon:** plants, maintains and manages trees.

Y3 Animals including humans

1. identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
2. identify that humans and some other animals have skeletons and muscles for support, protection and movement

Assessment guidance	Key learning • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans) • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans**)**	Future learning • Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans) • Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans) • Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)

	Common Misconceptions Some children may think: • certain whole food groups like fats are 'bad' for you • certain specific foods, like cheese are also 'bad' for you • diet and fruit drinks are 'good' for you • snakes are similar to worms, so they must also be invertebrates • invertebrates have no form of skeleton.	
Substantive Knowledge	**Key learning** Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients that are needed by the body to stay healthy – carbohydrates including sugars, protein, vitamins, minerals, fibre, fat, sugars, water. A piece of food will often provide a range of nutrients. Humans and some other animals have skeletons and muscles which help them move and provide protection and support **Key vocabulary:** Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints	**Possible Evidence** Can name the nutrients found in food Can state that to be healthy we need to eat the right types of food to give us the correct amount of these nutrients Can name some bones that make up their skeleton giving examples that support, help them move or provide protection Can describe how muscles and joints help them to move
Working Scientifically Skills	**Classify food** in a range of ways Use food labels to explore the nutritional content of a range of food items **Use secondary sources** to find out they types of food that contain the different nutrients Use food labels to **answer enquiry questions** e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks? Plan a daily diet contain a good balance of nutrients Explore the nutrients contained in fast food **Use secondary sources** to research the parts and functions of the skeleton Investigate **pattern seeking questions** such as ● Can people with longer legs run faster? ● Can people with bigger hands catch a ball better? **Compare, contrast and classify** skeletons of different animals	Can **classify food** into those that are high or low in particular nutrients Can **answer their questions** about nutrients in food based on their **gathered evidence** Can talk about the nutrient content of their daily plan Use their **data to look for patterns** (or lack of) when answering their enquiry question Can give similarities e.g. they all have joints to help the animal move, and differences between skeletons
Cross- curricular links	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education **British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities**

Career Links

Biochemist :investigates chemical processes that take place inside living things. **Biomedical engineer :**designs biomedical equipment, including artificial organs**. Doctor :**someone who maintains or restores human health through the practice of medicine. **Dietician :**develops nutrition advice to improve people's diets**. Exercise physiologist:** a doctor who helps people improve their fitness. **Neurologist :**a doctor specialising in the brain and nervous system. **Nurse:** plan and provide medical and nursing care to patients in hospital, at home or in other settings. **Nutritionist:** studies nutrition in food and how it affects our bodies. **Paediatrician** : a doctor specialising in children's medicine. **Pathologist:** a doctor who specialises in body fluids and tissues. **Pharmacist:** dispenses medicines and gives advice on medicines. **Pharmacologists:** research new medicines to fight diseases.

Y3 Rocks

1. compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
2. describe in simple terms how fossils are formed when things that have lived are trapped within rock
3. recognise that soils are made from rocks and organic matter

Assessment guidance	**Prior learning** • Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)	**Future learning** • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance) • The composition of the Earth. (KS3) • The structure of the Earth. (KS3) • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. (KS3)
Substantive Knowledge	**Key learning** Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock piece and the amount of organic matter affect the property of the soil.	**Possible Evidence** Can name some types of rock and give physical features of each Can explain how a fossil is formed Can explain that soils are made from rocks and also contain living/dead matter

	Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water. **Key vocabulary:** Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil	Outdoor learning opportunity: Scratch test for properties of a rock.
	Common Misconceptions Some children may think: • rocks are all hard in nature • rock-like, man-made substances such as concrete or brick are rocks • materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer 'natural' • certain found artefacts, like old bits of pottery or coins, are fossils • a fossil is an actual piece of the extinct animal or plant • soil and compost are the same thing.	
Working Scientifically Skills	**Observe rocks** closely **Classify rocks** in a range of ways based on their appearance Devise a **test to investigate** the hardness of a range of rocks Devise a **test to investigate** how much water different rocks absorb **Observe how rocks change over time** e.g. gravestones or old building **Research using secondary sources** how fossils are formed Observe soils closely **Classify soils** in a range of ways based on their appearance **Devise a test to investigate** the water retention of soils **Observe how soil can be separated** through sedimentation	**Can classify rocks** in a range of different ways using appropriate vocabulary Can **devise tests** to explore the properties of rocks and **use data to rank the rocks** Can link rocks **changing over time** with their properties e.g. soft rocks get worn away more easily Can present in different ways their understanding of how fossils are formed e.g. in role play, comic strip, chronological report, stop-go animation etc. Can **identify plant/animal** matter and rocks in samples of soil Can **devise a test** to explore the water retention of soils
Cross- curricular links	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Workshops from Geobus on fossils and rocks Visit to the Natural History Museum Workshop with the Garden Classroom

Career Links

Agronomist: studies soil and plant growth. **Archaeologist:** studies history using artefacts. **Architect**: uses art and science to design buildings that are strong and efficient as well as being pleasant to look at. **Builder**: builds structures. **Crystallographer**: studies the structures and properties of crystals. **Geologist**: studies the structure of the earth and its natural resources. This involves analysing rocks, fossils, soil and minerals. They also assess the hazards such as volcanoes and earthquakes. **Palaeobotanist**: studies plant fossils. **Palaeontologist**: studies fossils. **Seismologist**: studies earthquakes. **Volcanologist**: studies volcanoes. **Farmer**: grows crops and understands about different soil types.

Y3 Light

1. recognise that they need light in order to see things and that dark is the absence of light
2. notice that light is reflected from surfaces
3. recognise that light from the sun can be dangerous and that there are ways to protect their eyes
4. recognise that shadows are formed when the light from a light source is blocked by an opaque object
5. find patterns in the way that the size of shadows change

Assessment guidance	**Prior learning** • Explore how things work. (Nursery – Light) • Talk about the differences in materials and changes they notice. (Nursery – Light) • Describe what they see, hear and feel whilst outside. (Reception – Light) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials)	**Future learning** • Recognise that light appears to travel in straight lines. (Y6 - Light) • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. (Y6 - Light) • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. (Y6 - Light) • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. (Y6 - Light)

<table>
<tr><td>Substantive Knowledge</td><td>Key learning
We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective. The light from the sun can damage our eyes and therefore we should not look directly at the Sun and can protect our eyes by wearing sunglasses or sunhats in bright light.
Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface.
Key vocabulary:
Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous</td><td>Possible Evidence
Can describe how we see objects in light and can describe dark as the absence of light
Can state that it is dangerous to view the sun directly and state precautions used to view the sun, for example in eclipses
Can define transparent, translucent and opaque
Can describe how shadows are formed by objects blocking light.

Outdoor learning opportunity: Making shadows.</td></tr>
<tr><td></td><td colspan="2">Common Misconceptions
Some children may think:
• we can still see even where there is an absence of any light
• our eyes ‘get used to’ the dark
• the moon and reflective surfaces are light sources
• a transparent object is a light source
• shadows contain details of the object, such as facial features on their own shadow
• shadows result from objects giving off darkness.</td></tr>
<tr><td>Working Scientifically Skills</td><td>Explore how different objects are more or less visible in different levels of lighting
Explore how objects with different surfaces e.g. shiny vs matt are more or less visible
Explore how shadows vary as the distance between a light source, an object or surface is changed
Explore shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground
Choose suitable materials to make shadow puppets
Create artwork using shadows
STEM PROJECT: Make shadow puppets</td><td>Can describe patterns in visibility of different objects in different lighting conditions and predict which will be more or less visible as conditions change
Can clearly explain, giving examples, that objects are not visible in complete darkness
Can describe and demonstrate how shadows are formed by blocking light
Can describe, demonstrate and make predictions about patterns in how shadows vary</td></tr>
<tr><td>Cross- curricular links
DT</td><td>UNCRC or Global Goals
Article 13: Freedom of expression
Article 24: Good health and health services
Article 28: Right to education
Article 31: Leisure, play and culture
Global Goal 3: Good health and well-being
Global Goal 4: Quality Education</td><td>British Values
Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)</td><td>Cultural Capital: Skills builder and trip/visitor opportunities</td></tr>
</table>

Career Links

Architect: uses art and science to design buildings that are strong and reflect/ use light well. **Astronomer**: studies the universe beyond earth, including stars, the Sun and planets. **Astrophysicist:** studies the physics of space and objects in space including the Sun. **Ophthalmologist:** a doctor specialising in vision and eye health. **Optician:** a doctor specialising in vision and eye health.

Y3 Forces and magnets

1. compare how things move on different surfaces
2. notice that some forces need contact between two objects, but magnetic forces can act at a distance
3. observe how magnets attract or repel each other and attract some materials and not others
4. compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
5. describe magnets as having two poles
6. predict whether two magnets will attract or repel each other, depending on which poles are facing

Assessment guidance	**Prior learning** • Explore how things work. (Nursery – Forces) • Explore and talk about different forces they can feel. (Nursery – Forces) • Talk about the differences between materials and changes they notice. (Nursery – Forces) • Explore the natural world around them. (Reception – Forces) • Describe what they see, hear and feel whilst outside. (Reception – Forces) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	**Future learning** • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 - Forces) • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 - Forces) • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 - Forces) • Magnetic fields by plotting with compass, representation by field lines. (KS3) • Earth's magnetism, compass and navigation. (KS3)

<table>
<tr><td>Substantive Knowledge</td><td colspan="2">Key learning
A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes.
A magnet attracts magnetic material. Iron and nickel and other materials containing these e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles e.g. a north and south, are brought together they will pull together – attract.
For some forces to act there must be contact e.g. a hand opening a door, the wind pushing the trees. Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attracts.
Key vocabulary:
Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole</td><td>Possible Evidence
Can give examples of forces in everyday life
Can give examples of objects moving differently on different surfaces
Can name a range of types of magnets and show how the poles attract and repel
Can draw diagrams using arrows to show the attraction and repulsion between the poles of magnets</td></tr>
<tr><td></td><td colspan="2">Common Misconceptions
Some children may think:
• the bigger the magnet the stronger it is
• all metals are magnetic.</td><td></td></tr>
<tr><td>Working Scientifically Skills</td><td colspan="2">Carry out investigations to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc.
Explore what materials are attracted to a magnet
Classify materials according to whether they are magnetic
Explore the way that magnets behave in relation to each other
Use a marked magnet to find the unmarked poles on other types of magnets
Explore how magnets work at a distance e.g. through the table, in water, jumping paper clip up off the table
Devise an investigation to test the strength of magnets</td><td>Can use their results to describe how objects move on different surfaces
Can use their results to make predictions for further tests e.g. it will spin for longer on this surface than that, but not as long as it spun on that surface
Can use classification evidence to identify that some metals but not all are magnetic
Through their exploration they can show how like poles repel and unlike poles attract and name unmarked poles
Can use test data to rank magnets

Outdoor learning opportunity: Egg drop</td></tr>
<tr><td>Cross- curricular links</td><td>UNCRC or Global Goals
Article 13: Freedom of expression
Article 24: Good health and health services
Article 28: Right to education
Article 31: Leisure, play and culture
Global Goal 3: Good health and well-being
Global Goal 4: Quality Education</td><td>British Values
Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)</td><td>Cultural Capital: Skills builder and trip/visitor opportunities</td></tr>
</table>

Year 4

Y4 Living things and their habitats

1. recognise that living things can be grouped in a variety of ways
2. explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
3. recognise that environments can change and that this can sometimes pose dangers to living things

Assessment guidance	**Prior learning** • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans) • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)	**Future learning** • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)
Substantive Knowledge	**Key learning** Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things. Living things live in a habitat which provides an environment to which they are suited (year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way i.e. positive human impact, such as setting up nature reserves or in a bad way i.e. negative human impact, such as littering. These environments also change with the seasons; different living things can be found in a habitat at different times of the year. Living things can be classified as producers, predators and prey according to their place in the food chain. **Key vocabulary** Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate	**Possible Evidence** Can name living things living in a range of habitats, giving the key features that helped them to identify them Can give examples of how an environment may change both naturally and due to human impact Outdoor learning opportunity: Local survey

	Common Misconceptions Some children may think: • the death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain • there is always plenty of food for wild animals • animals are only land-living creatures • animals and plants can adapt to their habitats, however they change • all changes to habitats are negative.		
Working Scientifically Skills	**Observe plants and animals** in different habitats throughout the year **Compare and contrast** the living things observed Use **classification keys** to name unknown living things **Classify living things found** in different habitats based on their features Create a simple identification key based on observable features Use **fieldwork to explore** human impact on the local environment e.g. litter, tree planting Use **secondary sources** to find out about how environments may naturally change Use **secondary sources** to find out about human impact, both positive and negative, on environments		Can keep a **careful record** of living things found in different habitats throughout the year (diagrams, tally charts etc.) Can use classification keys to **identify** unknown plants and animals Can present their learning about changes to the environment in different ways e.g. campaign video, persuasive letter
Cross- curricular links	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Workshop with the Garden Classroom Visit to Islington Ecology Centre

Y4 Animals including humans

1. describe the simple functions of the basic parts of the digestive system in humans
2. identify the different types of teeth in humans and their simple functions
3. construct and interpret a variety of food chains, identifying producers, predators and prey

Assessment guidance	**Prior learning** • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)	**Future learning** • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. (Y6 - Animals, including humans) • Recognise the impact of diet, exercise, drugs and lifestyle on the way

	• Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans)	their bodies function. (Y6 - Animals, including humans) • Describe the ways in which nutrients and water are transported within animals, including humans. (Y6 - Animals, including humans)
Substantive Knowledge	**Key learning** Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added. The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet. Humans have four types of teeth - incisors for cutting, canines for tearing, molars and premolars for grinding (chewing). **Key vocabulary** 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	**Possible Evidence** Can sequence the main parts of the digestive system Can draw the main parts of the digestive system onto a human outline Can describe what happens in each part of the digestive system Can point to the three different types of teeth in their mouth and talk about their shape and what they are used for Can name producers, predators and prey within a habitat Can construct food chains
	Common Misconceptions Some children may think: • arrows in a food chains mean ‘eats’ • the death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain • there is always plenty of food for wild animals • your stomach is where your belly button is • food is digested only in the stomach • when you have a meal, your food goes down one tube and your drink down another • the food you eat becomes “poo” and the drink becomes “wee”.	
Working Scientifically Skills	**Research** the function of the parts of the digestive system **Create a model** of the digestive system using household objects **Explore eating** different types of food, to identify which teeth are being used for cutting, tearing and grinding (chewing) **Classify animals** as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls Use food chains to **identify** producers, predators and prey within a habitat Use **secondary sources** to identify animals in a habitat and find out what they eat	Can use **diagrams** or a model to describe the journey of food through the body explaining what happens in each part. Can **record** the teeth in their mouth (make a dental record) Can **explain the role** of the different types of teeth Can **explain** how the teeth in animal skulls show they are carnivores, herbivores or omnivores. Can **create food chains** based on research

Cross- curricular links	**UNCRC or Global Goals**	**British Values**	**Cultural Capital: Skills builder and trip/visitor opportunities**
English: Diary of a poo **EE:** Presenting **Geography :** Africa, Savannah (food chain) **PSHE** Healthy teeth, Healthy eating	Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	Zoo or farm visit

Career Links

Animal behaviourist: studies animal interactions. **Biochemist:** investigates chemical processes that take place inside living things. **Conservationist:** works for the protection and preservation of living things and the environment. **Farmer:** grows crops and raises animals for food.**Herpetologist:** studies amphibians and reptiles. **Ichthyologist:** studies fish. **Lepidopterist:** studies butterflies and moths. **Marine biologist:** studies living things in oceans. **Mammologist:** studies mammals. **Naturalist:** scientist who studies the natural world. **Ornithologist:** studies birds. **Taxonomist:** classifies animals and plants. **Vet:** looks after unwell animals. **Wildlife filmmaker:** creates films and documentaries about wildlife.

Y4 States of matter

1. compare and group materials together, according to whether they are solids, liquids or gases
2. observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
3. identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

Assessment guidance	**Prior learning**	**Future learning**
	• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)	• Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials) • Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials)

	• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 - Properties and changes of materials) • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials) • Demonstrate that dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials) • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. (Y5 - Properties and changes of materials)
Substantive Knowledge	**Key learning** A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid. Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0^{o}C. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100^{o}C. Evaporation is the same state change as boiling (liquid to gas) but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling. Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle. **Key vocabulary** Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle	**Possible Evidence** Can create a concept map, including arrows linking the key vocabulary Can name properties of solids, liquids and gases Can give everyday examples of melting and freezing Can give everyday examples of evaporation and condensation Can describe the water cycle

	Common Misconceptions Some children may think: • 'solid' is another word for hard or opaque • solids are hard and cannot break or change shape easily and are often in one piece • substances made of very small particles like sugar or sand cannot be solids • particles in liquids are further apart than in solids and they take up more space • when air is pumped into balloons, they become lighter • water in different forms – steam, water, ice – are all different substances • all liquids boil at the same temperature as water (100 degrees) • melting, as a change of state, is the same as dissolving • steam is visible water vapour (only the condensing water droplets can be seen) • clouds are made of water vapour or steam • the substance on windows etc. is condensation rather than water • the changing states of water (illustrated by the water cycle) are irreversible • evaporating or boiling water makes it vanish • evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material.		
Working Scientifically Skills	**Observe closely and classify** a range of solids **Observe closely and classify** a range of liquids **Explore** making gases visible e.g. squeezing sponges under water to see bubbles, and showing their effect e.g. using straws to blow objects, trees moving in the wind **Classify materials** according to whether they are solids, liquids and gases **Observe a range of materials** melting e.g. ice, chocolate, butter **Investigate** how to melt ice more quickly **Observe the changes** when making rocky road cakes or ice-cream **Investigating** melting point of different materials e.g. ice, margarine, butter and chocolate **Explore freezing** different liquids e.g. tomato ketchup, oil, shampoo Use a thermometer to **measure temperatures** e.g. icy water (melting), tap water, hot water, boiling water (demonstration) **Observe** water evaporating and condensing e.g. on cups of icy water and hot water **Set up investigations** to explore changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers Use **secondary sources** to find out about the water cycle		Can **give reasons** to justify why something is a solid liquid or gas Can **give examples** of things that melt/freeze and how their melting points vary From their observations, can give the melting points of some materials Using their **data, can explain** what affects how quickly a solid melts Can **measure** temperatures using a thermometer Can explain why there is condensation on the inside the hot water cup but on the outside of the icy water cup From their **data**, can **explain** how to speed up or slow down evaporation Can **present their learning** about the water cycle in a range of ways e.g. diagrams, explanation text, story of a water droplet
Cross- curricular links	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Visit to Science Museum

Career Links

Chemists: study the substances that make up matter, the properties and changes that take place when solids, liquids and gases are combined to create new substances. **Chemical engineer:** solves problems involving chemicals. **Materials scientist:** researches structures and properties of materials. **Mechanical engineer:** designs, analyses and manufactures mechanical systems. **Nanoscientist:** studies incredibly small things, such as atoms. **Water engineer:** ensures that we have a continuous supply of clean water. Designing and making water management systems.

Y4 Sound

1. identify how sounds are made, associating some of them with something vibrating
2. recognise that vibrations from sounds travel through a medium to the ear
3. find patterns between the pitch of a sound and features of the object that produced it
4. find patterns between the volume of a sound and the strength of the vibrations that produced it
5. recognise that sounds get fainter as the distance from the sound source increases

Assessment guidance	**Prior learning** • Explore how things work. (Nursery – Sound) • Describe what they see, hear and feel whilst outside. (Reception – Sound) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)	**Future learning** • Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. (KS3) • Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. (KS3) • Sound needs a medium to travel, the speed of sound in air, in water, in solids. (KS3) • Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. (KS3) • Auditory range of humans and animals. (KS3) • Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. (KS3) • Waves transferring information for conversion to electrical signals by microphone. (KS3)

<table>
<tr><td>Substantive Knowledge</td><td colspan="2">Key learning
A sound source produces vibrations which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.
The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively.
Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.
Key Vocabulary
Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation</td><td>Possible evidence
Can name sound sources and state that sounds are produced by the vibration of the object.
Can state that sounds travel through different mediums such as air, water, metal
Can give examples to demonstrate how the pitch of a sound are linked to the features of the object that produced it
Can give examples of how to change the volume of a sound e.g. increase the size of vibrations by hitting or blowing harder
Can give examples to demonstrate that sounds get fainter as the distance from the sound source increases</td></tr>
<tr><td></td><td colspan="3">Common Misconceptions
Pitch and volume are frequently confused, as both can be described as high or low.
Some children may think:
• sound is only heard by the listener
• sound only travels in one direction from the source
• sound can’t travel through solids and liquids
• high sounds are loud and low sounds are quiet.</td></tr>
<tr><td>Working Scientifically Skills</td><td colspan="2">Classify sound sources
Explore making sounds with a range of objects such as musical instruments and other household objects
Explore how string telephones or ear gongs work
Explore using objects that change in feature to change pitch and volume such as length of guitar string, bottles of water or tuning forks
Measure sounds over different distances
Measure sounds through different insulation materials</td><td>Can explain what happens when you strike a drum or pluck a string and use a diagram to show how sounds travel from an object to the ear
Can demonstrate how to increase or decrease pitch and volume using musical instruments or other objects
Can use data to identify patterns in pitch and volume
Can explain how loudness can be reduced by moving further from the sound source or by using a sound insulating medium

Outdoor learning opportunities- measurement of sound.</td></tr>
<tr><td>Cross- curricular links</td><td>UNCRC or Global Goals
Article 13: Freedom of expression
Article 24: Good health and health services
Article 28: Right to education
Article 31: Leisure, play and culture
Global Goal 3: Good health and well-being
Global Goal 4: Quality Education</td><td>British Values
Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)</td><td>Cultural Capital: Skills builder and trip/visitor opportunities

Visit to Science Museum
Visit to Benjamin Franklin House</td></tr>
</table>

Career Links

Audiologist: studies sound and its properties. **Audio technician:** responsible for using sound recording equipment. **Physicist:** studies physics. **Sound engineer:** sets up and operates sound equipment. Records and edits sound for films, games, concerts and sporting events.

Y4 Electricity

1. identify common appliances that run on electricity
2. construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
3. identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
4. recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
5. recognise some common conductors and insulators, and associate metals with being good conductors

Assessment guidance	**Prior learning** • Explore how things work. (Nursery - Electricity)	**Future learning** • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. (Y6 - Electricity) • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. (Y6 - Electricity) • Use recognised symbols when representing a simple circuit in a diagram. (Y6 - Electricity)
Substantive Knowledge	**Key learning** Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit the component will not work. A switch can be added to the circuit to turn the component on and off. Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity **Key Vocabulary** Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol N.B. Children in year 4 do not need to use standard symbols as this is taught in year 6	**Possible Evidence** Can name the components in a circuit Can make electric circuits Can control a circuit using a switch Can name some metals that are conductors Can name materials that are insulators

<table>
<tr><td></td><td colspan="3">Common Misconceptions
Some children may think:
• electricity flows to bulbs, not through them
• electricity flows out of both ends of a battery
• electricity works by simply coming out of one end of a battery into the component.</td></tr>
<tr><td>Working Scientifically Skills</td><td colspan="2">Construct a range of circuits
Explore which materials can be used instead of wires to make a circuit
Classify the materials that were suitable/not suitable for wires
Explore how to connect a range of different switches and investigate how they function in different ways
Choose switches to add to circuits to solve particular problems such as a pressure switch for a burglar alarm
Apply their knowledge of conductors and insulators to design and make different types of switch
Make circuits that can be controlled as part of a D&T project

N.B. Children should be given one component at a time to add to circuits.</td><td>Can communicate structures of circuits using drawings which show how the components are connected
Use classification evidence to identify that metals are good conductors and non-metals are insulators
Can incorporate a switch into a circuit to turn it on and off
Can connect a range of different switches identifying the parts that are insulators and conductors
Can add a circuit with a switch to a DT project and can demonstrate how it work: STEM Project, Mars Rover
Can give reasons for choice of materials for making different parts of a switch
Can describe how their switch works</td></tr>
<tr><td>Cross- curricular links
STEM project and DT</td><td>UNCRC or Global Goals
Article 13: Freedom of expression
Article 24: Good health and health services
Article 28: Right to education
Article 31: Leisure, play and culture
Global Goal 3: Good health and well-being
Global Goal 4: Quality Education</td><td>British Values
Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)</td><td>Cultural Capital: Skills builder and trip/visitor opportunities

Visit to Science Museum
Visit to Benjamin Franklin House</td></tr>
<tr><td colspan="4">Career Links

Electrical engineer: works with equipment that uses electricity. Electrician: installs and maintains electrical equipment. Physicist: studies physics. Renewable energy engineer: works on environmentally-conscious energy production.</td></tr>
</table>

Year 5

Y5 Living things and their habitats

1. describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
2. describe the life process of reproduction in some plants and animals

Assessment guidance	**Prior learning** • Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)	**Future learning** • Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3) • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)
Substantive Knowledge	**Key learning** As part of their life cycle plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals including humans have offspring which grow into adults. In humans and some animals these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis. Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects. **Key vocabulary** Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings	**Possible evidence** Can draw the life cycle of a range of animals identifying similarities and differences between the life cycles Can explain the difference between sexual and asexual reproduction and give examples of how plants reproduce in both ways

	Common Misconceptions Some children may think: • all plants start out as seeds • all plants have flowers • plants that grow from bulbs do not have seeds • only birds lay eggs.		
Working Scientifically Skills	Use **secondary sources** and, where possible, **first hand observations** to find out about the life cycle of a range of animals Compare the gestation times for mammals and **look for patterns** e.g. in relation to size of animal or length of dependency after birth **Look for patterns** between the size of an animal and its expected life span Grow and observe plants that reproduce asexually e.g. strawberries, spider plant, potatoes Take cuttings from a range of plants e.g. African violet, mint Plant bulbs and then harvest to see how they multiply Use **secondary sources** to find out about pollination		Can **present their understanding** of the life cycle of a range of animals in different ways e.g. drama, pictorially, chronological reports, creating a game Can **identify patterns** in life cycles Can **compare** two or more animal life cycles studied Can explain how a range of plants reproduce asexually
Cross- curricular links	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Visit to London Zoo Visit to Islington Ecology Centre

Y5 Animals including humans

1. describe the changes as humans develop to old age

Assessment guidance	**Prior learning** • Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)	**Future learning** • Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3)

<table>
<tr><td>Substantive Knowledge</td><td>Key learning
When babies are young they grow rapidly. They are very dependent on their parents. As they develop they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.

This needs to be taught alongside PSHE
Useful guidance can be obtained at:
http://www.ase.org.uk/news/aseviews/teaching-about-puberty/
http://www.ase.org.uk/documents/2016-joint-statement-on-reproduction/

Key vocabulary
Puberty: the vocabulary to describe sexual characteristics</td><td>Possible evidence
Can explain the changes that takes place in boys and girls during puberty
Can explain how a baby changes physically as it grows and also what it is able to do</td></tr>
<tr><td></td><td colspan="2">Common Misconceptions
Some children may think:
• a baby grows in a mother's tummy
• a baby is "made".</td></tr>
<tr><td>Working Scientifically Skills</td><td>This unit is likely to be taught through direct instruction due to its sensitive nature</td><td></td></tr>
<tr><td>Cross- curricular links</td><td>UNCRC or Global Goals
Article 13: Freedom of expression
Article 24: Good health and health services
Article 28: Right to education
Article 31: Leisure, play and culture
Global Goal 3: Good health and well-being
Global Goal 4: Quality Education</td><td>British Values
Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)</td></tr>
<tr><td colspan="3">Career Links
Animal behaviourist: studies animal interactions. Biochemist: investigates chemical processes that take place inside living things. Conservationist: works for the protection and preservation of living things and the environment. Farmer: grows crops and raises animals for food. Herpetologist: studies amphibians and reptiles. Ichthyologist: studies fish. Lepidopterist: studies butterflies and moths. Marine biologist: studies living things in oceans. Mammologist: studies mammals. Naturalist: scientist who studies the natural world. Ornithologist: studies birds. Taxonomist: classifies animals and plants. Vet: looks after unwell animals. Wildlife filmmaker: creates films and documentaries about wildlife. Zoologist: studies animals</td></tr>
</table>

Y5 Properties and changes of materials

1. compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
2. know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
3. use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
4. give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
5. demonstrate that dissolving, mixing and changes of state are reversible changes
6. explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda

Assessment guidance	**Prior learning** • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets) • Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter) • Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). (Y4 - States of matter) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)	**Future learning** • Chemical reactions as the rearrangement of atoms. (KS3) • Representing chemical reactions using formulae and using equations. (KS3) • Combustion, thermal decomposition, oxidation and displacement reactions. (KS3) • Defining acids and alkalis in terms of neutralisation reactions. (KS3) • The pH scale for measuring acidity/alkalinity; and indicators. (KS3)
Substantive Knowledge	**Key learning** Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. Mixtures can be separated by filtering, sieving and evaporation. Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible. **Key vocabulary** Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material	**Possible evidence** Can use understanding of properties to explain everyday uses of materials. For example, how bricks, wood, glass and metals are used in buildings Can explain what dissolving means, giving examples Can name equipment used for filtering and sieving Can use knowledge of liquids, gases and solids to suggest how materials can be recovered from solutions or mixtures by evaporation, filtering or sieving Can describe some simple reversible and non-reversible changes to materials, giving examples

	Common Misconceptions Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed. Some children may think: • thermal insulators keep cold in or out • thermal insulators warm things up • solids dissolved in liquids have vanished and so you cannot get them back • lit candles only melt, which is a reversible change.			
Working Scientifically Skills	**Investigate** the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat **Explore** adding a range of solids to water and other liquids e.g. cooking oil, as appropriate Investigate rates of dissolving by carrying out comparative and fair test Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture **Explore** a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning Carry out **comparative and fair tests** involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced? **Research new materials** produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton)			Can **create a chart** or table grouping/comparing everyday materials by different properties Can **use test evidence gathered** about different properties to **suggest** an appropriate material for a particular purpose Can group solids based on their observations when mixing them with water Can **give reasons** for choice of equipment and methods to separate a given solution or mixture such as salt or sand in water Can **explain the results** from their investigations involving dissolving and non-reversible change Outdoor learning opportunity: testing appropriate materials.
Cross-curricular links	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education		**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities**

Career Links

Chemist: study the substances that make up matter, the properties and changes that take place when solids, liquids and gases are combined to create new substances. **Colour technician:** design and produce colours using a variety of techniques and chemicals to produce dyes and pigments.

Environmental engineer: make sure water is safe to drink, and protect people from the effects of the environment, such as pollution. **Water engineer:** ensure that we have a continuous supply of clean water. Designing and making water management systems.

Y5 Earth and space

1. describe the movement of the Earth, and other planets, relative to the Sun in the solar system
2. describe the movement of the Moon relative to the Earth
3. describe the Sun, Earth and Moon as approximately spherical bodies
4. use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky

Assessment guidance	**Prior learning** • Explore the natural world around them. (Reception – Earth and space) • Describe what they see, hear and feel whilst outside. (Reception – Earth and space) • Observe changes across the four seasons. (Y1 - Seasonal changes) • Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes)	**Future learning** • Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). (KS3) • Our Sun as a star, other stars in our galaxy, other galaxies. (KS3) • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3) • The light year as a unit of astronomical distance. (KS3)
Substantive Knowledge	**Key learning** The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes 365¼ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (here it is day) and half is facing away from the Sun (night). As the Earth rotates the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical. **Key vocabulary** Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune) spherical, solar system, rotates, star, orbit, planets	**Possible evidence** Can create a voice over for a video clip or animation Can show using diagrams the movement of the Earth and Moon Can explain the movement of the Earth and Moon Can show using diagrams the rotation of the Earth and how this causes day and night Can explain what causes day and night

	Common misconceptions Some children may think: • the Earth is flat • the Sun is a planet • the Sun rotates around the Earth • the Sun moves across the sky during the day • the Sun rises in the morning and sets in the evening • the Moon appears only at night • night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.		
Working Scientifically Skills	Use **secondary sources** to help create a model e.g. role play or using balls, to show the movement of the Earth around the Sun and the Moon around the Earth. Use **secondary sources** to help make a model to show why day and night occur Make **first-hand observations** of how shadows caused by the Sun change through the day Make a sundial Research time zones Consider the **views of scientists** in the past and evidence used to deduce shapes and movements of the Earth, Moon and planets before space travel		Can use the model to **explain** how the Earth moves in relation to the Sun and the moon moves in relation to the Earth Can **demonstrate and explain verbally** how day and night occur Can **explain evidence** gathered about the position of shadows in term of the movement of the Earth. Can show this using a model Can e**xplain** how a sundial works Can **explain** verbally using a model why we have time zones Can describe the arguments and evidence used by scientists in the past
Cross- curricular links **English non-chron reports**	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Planets workshop with Geobus

Career Links

Astronomer: studies the universe beyond earth, including stars and planets. **Astrophysicist:** studies the physics of space and objects in space. **Astronaut:** travels to space to carry out research. **Astronautical engineer:** work with cutting-edge technology and international companies to design, develop, maintain and tests the performance of satellites and space vehicles. **Astrobiologists:** study how microbes might live and behave in outer space, and what this might mean for life on other planets. **Astrophysicist:** studies the physics of space and objects in space. **Mechanical engineer:** helps to design, analyse, make and maintain mechanical systems such as spacecraft, aircraft, trains and cars. **Physicist:** studies physics.

Y5 Forces

1. explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
2. identify the effects of air resistance, water resistance and friction, that act between moving surfaces
3. recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect

<table>
<tr>
<td>Assessment guidance</td>
<td>Prior learning
• Compare how things move on different surfaces. (Y3 - Forces and magnets)
• Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)
• Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets)
• Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)
• Describe magnets as having two poles. (Y3 - Forces and magnets)
• Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)</td>
<td>Future learning
• Forces as pushes or pulls, arising from the interaction between two objects. (KS3)
• Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. (KS3)
• Moment as the turning effect of a force. (KS3)
• Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. (KS3)
• Forces measured in Newtons, measurements of stretch or compression
as force is changed. (KS3)</td>
</tr>
<tr>
<td>Substantive Knowledge</td>
<td>Key learning
A force causes an object to start moving, stop moving, speed up, slow down or change direction.
Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.
Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water or the air and water may be moving over a stationary object.
A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.
Key vocabulary
Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears</td>
<td>Possible evidence
Can demonstrate the effect of gravity acting on an unsupported object
Can give examples of friction, water resistance and air resistance
Can give examples of when it is beneficial to have high or low friction, water resistance and air resistance
Can demonstrate how pulleys, levers and gears work</td>
</tr>
</table>

	Common Misconceptions Some children may think: • the heavier the object the faster it falls, because it has more gravity acting on it • forces always act in pairs which are equal and opposite • smooth surfaces have no friction • objects always travel better on smooth surfaces • a moving object has a force which is pushing it forwards and it stops when the pushing force wears out • a non-moving object has no forces acting on it • heavy objects sink and light objects float.		
Working Scientifically Skills	**Investigate** the effect of friction in a range of contexts e.g. trainers, bath mats, mats for a helter-skelter **Investigate** the effects of water resistance in a range of contexts e.g. dropping shapes through water, pulling shapes e.g. boats along the surface of water **Investigate** the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats Explore how levers, pulleys and gears work Create a timer that uses gravity to move a ball **Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation**		Can **explain** the results of their investigations in terms of the force, showing a good understanding that as the object tries to move through the water or air or across the surface, the particles in the water, air or on the surface slow it down **STEM Project: Chain Reaction : Make a product that involves a lever, pulley or gear**
Cross- curricular links STEM project	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Visit to Benjamin Franklin House

Career Links

Aeronautical engineer: use their technical knowledge to improve flight safety and fuel efficiency, reduce costs and address the environmental impact of air travel. **Astronautical engineers:** work with cutting-edge technology and international companies to design, develop, maintain and test the performance of satellite and space vehicles. **Builder**: builds structures. Mechanical engineer: helps to design, analyse, make and maintain mechanical systems such as spacecraft, aircraft, trains and cars. Physicist: studies physics. **Pilot:** fly passengers or cargo on long or short-haul flights for leisure, business, military or commercial purposes. **Renewable energy engineer:** works on environmentally-conscious energy production e.g. wind turbines

Year 6

Y6 Living things and their habitats

1. describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
2. give reasons for classifying plants and animals based on specific characteristics

<table>
<tr><td>Assessment guidance</td><td colspan="2">Prior learning
• Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats)
• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats)
• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)
• Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)</td><td>Future learning
• Differences between species. (KS3)</td></tr>
<tr><td>Substantive Knowledge</td><td colspan="2">Key learning
Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other livings things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot.
Animals can be divided into two main groups – those that have backbones (vertebrates) and those that do not (invertebrates). Vertebrates can be divided into five small groups – fish, amphibians, reptiles, birds and mammals. Each group has common characteristics.
Invertebrates can be divided into a number of groups including insects, spiders, snails and worms.
Plants can be divided broadly into two main groups – flowering plants and non-flowering plants.
Key vocabulary:
Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering and non-flowering</td><td>Possible Evidence
Can give examples of animals in the five vertebrate groups and some of the invertebrate groups
Can give the key characteristics of the five vertebrate groups and some invertebrate groups
Can compare the characteristics of animals in different groups
Can give examples of flowering and non-flowering plants

Outdoor learning opportunity: Local survey</td></tr>
<tr><td></td><td colspan="2">Common Misconceptions
Some children may think:
• all micro-organisms are harmful
• mushrooms are plants.</td></tr>
</table>

Working Scientifically Skills	Use **secondary sources** to learn about the formal classification system devised by **Carl Linnaeus** and why it is important Use **first hand observation** to identify characteristics shared by the animals in a group Use **secondary sources** to research the characteristics of animals that belong to a group Use information about the characteristics of an unknown animal or plant to assign it to a group **Classify plants and animals** presenting this in a range of ways – Venn diagrams, Carroll diagrams and keys Create an imaginary animal which has features from one or more groups		Can **use classification** materials to identify unknown plants and animals Can create **classification** keys for plants and animals Can give a number of characteristics that explain why an animal belongs to a particular group
Cross- curricular links STEM project	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** STEM Ambassadors careers workshop Visit to Islington Ecology Centre

Y6 Animals including humans

1. identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
2. recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
3. describe the ways in which nutrients and water are transported within animals, including humans

Assessment guidance	**Prior learning**	**Future learning**
	• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans) • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans) • Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans) • Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)	• The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3) • The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3) • The structure and functions of the gas exchange system in humans, including adaptations to function. (KS3) • The mechanism of breathing to move air in and out of the lungs. (KS3) • The impact of exercise, asthma and smoking on the human gas exchange system. (KS3)

<table>
<tr><td>Substantive Knowledge</td><td>Key learning
The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.
Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins.
Key vocabulary
Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle</td><td>Possible Evidence
Can draw a diagram of the circulatory system and label the parts and annotate it to show what the parts do
Produces a piece of writing that demonstrates the key knowledge e.g. explanation text, job description of the heart</td></tr>
<tr><td></td><td colspan="2">Common Misconceptions
Some children may think:
• your heart is on the left side of your chest
• the heart makes blood
• the blood travels in one loop from the heart to the lungs and around the body
• when we exercise, our heart beats faster to work the muscles more
• some blood in our bodies is blue and some blood is red
• we just eat food for energy
• all fat is bad for you
• all dairy is good for you
• protein is good for you, so you can eat as much as you want
• foods only contain fat if you can see it
• all drugs are bad for you.</td></tr>
<tr><td>Working Scientifically Skills</td><td>Create a role play model for the circulatory system
Carry out a range of pulse rate investigations
● Fair test – effect of different activities on my pulse rate
● Pattern seeking – exploring which groups of people may have higher or lower resting pulse rates
● Observation over time - how long does it take my pulse rate to return to my resting pulse rate (recovery rate)
● Pattern seeking – exploring recovery rate for different groups of people
Learn about the impact of exercise, diet, drugs and lifestyle on the body. This is likely to be taught through direct instruction due to its sensitive nature</td><td>Use the role play model to explain the main parts of the circulatory system and their role
Can use subject knowledge about the heart whilst writing conclusions for investigations
Can explain both the positive and negative effects of diet, exercise, drugs and lifestyle on the body
Present information e.g. in a health leaflet describing impact of drugs and lifestyle on the body</td></tr>
</table>

Cross- curricular links	UNCRC or Global Goals Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	British Values Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	Cultural Capital: Skills builder and trip/visitor opportunities Visit to Centre of the Cell

Career Links

Animal behaviourist: studies animal interactions. **Biologist:** studies living things. **Conservationist:** works for the protection and preservation of living things and the environment. E**ntomologist**: a biologist who studies insects, both their lifecycles and behaviour. **Herpetologist:** studies amphibians and reptiles. **Lepidopterist:** studies butterflies and moths. **Marine biologist:** studies living things in oceans. Mammologist: studies mammals. **Microbiologist:** studies tiny living things. **Naturalist:** scientist who studies the natural world. **Nematologist:** studies worms. **Ornithologist**: studies birds. **Parasitologist:** studies parasites. **Phenologist:** studies life cycles. Taxonomist: classifies animals and plants. **Veterinarian:** looks after unwell animals. **Wildlife filmmaker:** creates films and documentaries about wildlife.

Y6 Evolution and inheritance

1. recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
2. recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
3. identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

Assessment guidance	Prior learning • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 - Living things and their habitats) • Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants) • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)	Future learning • Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3) • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. (KS3) • The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. (KS3)

<table>
<tr><td></td><td>• Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5)</td><td>• Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. (KS3)</td></tr>
<tr><td>Substantive Knowledge</td><td>Key learning
All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other.
Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time these inherited characteristics become more dominant within the population. Over a very long period of time these characteristics may be so different to how they were originally that a new species is created. This is evolution.
Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.
Key vocabulary
Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils</td><td>Possible Evidence
Can explain the process of evolution
Can give examples of how plants and animals are suited to an environment
Can give examples of how an animal or plant has evolved over time e.g. penguin, peppered moth
Give examples of living things that lived millions of years ago and the fossil evidence we have to support this
Can give examples of fossil evidence that can be used to support the theory of evolution</td></tr>
<tr><td></td><td colspan="2">Common Misconceptions
Some children may think:
• adaptation occurs during an animal’s lifetime: giraffes’ necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life
• offspring most resemble their parents of the same sex, so that sons look like fathers
• all characteristics, including those that are due to actions during the parent’s life such as dyed hair or footballing skills, can be inherited
• cavemen and dinosaurs were alive at the same time.</td></tr>
<tr><td>Working Scientifically Skills</td><td>Design a new plant or animal to live in a particular habitat
Use models to demonstrate evolution e.g. Darwin’s finches bird beak activity
Use secondary sources to find out about how the population of peppered moths changed during the industrial revolution
Make observations of fossils to identify living things that lived on Earth millions of years ago
Identify features in animals and plants that are passed on to offspring
Explore this process by considering the artificial breeding of animals or plants e.g. dogs
Research the work of Mary Anning and how this provided evidence of evolution</td><td>Can identify characteristics that will make a plant or animal suited or not suited to a particular habitat
Can link the patterns seen in the model to the real examples
Can explain why the dominant colour of the peppered moth changed over a very short period of time</td></tr>
</table>

Cross- curricular links Literacy: Charles Darwin non-chron report	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Visit to Science Museum Talk from a palaeontologist or geologist

Career Links

Archaeologist: studies history using artefacts**. Geneticist:** studies genes. **Geologist: s**tudies the structure of the earth and its natural resources. **T**his involves analysing rocks, fossils, soil and minerals. **Paleobotanist:** studies plant fossils**. Paleontologist:** studies fossils.

Y6 Light

1. recognise that light appears to travel in straight lines
2. use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
3. explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
4. use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

Assessment guidance	**Prior learning** • Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light) • Notice that light is reflected from surfaces. (Y3 - Light) • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light) • Find patterns in the way that the size of shadows change. (Y3 - Light) • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials)	**Future learning** • The similarities and differences between light waves and waves in matter. (KS3) • Light waves travelling through a vacuum; speed of light. (KS3) • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. (KS3) • Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. (KS3) • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. (KS3) • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. (KS3)

<table>
<tr><td>Substantive Knowledge</td><td colspan="2">Key learning
Light appears to travel in straight lines and we see objects when light from them goes into our eyes. The light may come directly from light sources but for other objects some light must be reflected from the object into our eyes for the object to be seen.

Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.

Key vocabulary:
As for year 3 plus straight lines, light rays.</td><td>Possible Evidence
Can describe with diagrams or models as appropriate how light travels in straight lines either from sources or reflected from other objects into our eyes.
Can describe with diagrams or models as appropriate how light travels in straight lines past translucent or opaque objects to form a shadow of the same shape.</td></tr>
<tr><td></td><td colspan="3">Common Misconceptions
Some children may think:
• we see objects because light travels from our eyes to the object.</td></tr>
<tr><td>Working Scientifically Skills</td><td colspan="2">Explore different ways to demonstrate that light travels in straight lines e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shaped holes in card

Explore the uses of the behaviour of light, reflection and shadows such as in periscope design, rear view mirrors and shadow puppets.</td><td>Can explain how evidence from enquiries shows that light travels in straight lines

Can predict and explain with diagrams or models as appropriate how the path of light rays can be directed by reflection to be seen, for example reflection in car rear view mirrors or in a periscope.

Can predict and explain with diagrams or models as appropriate how the shape of shadows can be varied.</td></tr>
<tr><td>Cross- curricular links</td><td>UNCRC or Global Goals
Article 13: Freedom of expression
Article 24: Good health and health services
Article 28: Right to education
Article 31: Leisure, play and culture
Global Goal 3: Good health and well-being
Global Goal 4: Quality Education</td><td>British Values
Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)</td><td>Cultural Capital: Skills builder and trip/visitor opportunities

Visit to Science Museum</td></tr>
<tr><td colspan="4">Career Links

Architect: uses art and science to design buildings that are strong and reflect/ use light well. Astronomer: studies the universe beyond earth, including stars, the Sun and planets. Astrophysicist: studies the physics of space and objects in space including the Sun. Ophthalmologist: a doctor specialising in vision and eye health. Optician: a doctor specialising in vision and eye health.</td></tr>
</table>

Y6 Electricity

1. associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
2. compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches
3. use recognised symbols when representing a simple circuit in a diagram

<table>
<tr><td rowspan="2">Assessment guidance</td><td>Prior learning
• Identify common appliances that run on electricity. (Y4 - Electricity)
• Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. (Y4 - Electricity)
• Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. (Y4 - Electricity)
• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (Y4 - Electricity)
• Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)</td><td>Future learning
• Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. (KS3)
• Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. (KS3)
• Differences in resistance between conducting and insulating components (quantitative). (KS3)
• Static electricity. (KS3)</td></tr>
<tr><td>Substantive Knowledge</td><td>Key learning
Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well.
You can use recognised circuit symbols to draw simple circuit diagrams.
Key Vocabulary
Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage
NB Children do not need to understand what voltage is but will use volts and voltage to describe different batteries. The words cells and batteries are now used interchangeably</td><td>Possible Evidence
Can make electric circuits and demonstrate how variation in the working of particular components, such as the brightness of bulbs can be changed by increasing or decreasing the number of cells or using cells of different voltages

Can draw circuit diagrams of a range of simple series circuits using recognised symbols</td></tr>
<tr><td></td><td colspan="2">Common Misconceptions
Some children may think:
• larger-sized batteries make bulbs brighter
• a complete circuit uses up electricity
• components in a circuit that are closer to the battery get more electricity.</td></tr>
</table>

Working Scientifically Skills	**Explain** how a circuit operates to achieve particular operations, such as control the light for a torch with different brightnesses or make a motor go faster or slower Make circuits to **solve particular problems** such as a quiet and a loud burglar alarm Carry out **fair tests** exploring changes in circuits Make circuits that can be controlled as part of a D&T project		Can incorporate a switch into a circuit to turn it on and off Can change cells and components in a circuit to achieve a specific effect Can communicate structures of circuits using circuit diagrams with recognised symbols Can **devise** ways to measure brightness of bulbs, speed of motors, volume of a buzzer during a fair test Can **predict results** and **answer questions** by drawing on **evidence gathered**
Cross- curricular links	**UNCRC or Global Goals** Article 13: Freedom of expression Article 24: Good health and health services Article 28: Right to education Article 31: Leisure, play and culture Global Goal 3: Good health and well-being Global Goal 4: Quality Education	**British Values** Mutual respect and tolerance (fairness, collaborative work and working from a hypothesis to a conclusion)	**Cultural Capital: Skills builder and trip/visitor opportunities** Visit to Benjamin Franklin House
Career Links **Electrical engineer:** works with equipment that uses electricity. **Electrician: i**nstalls and maintains electrical equipment. **Physicist:** studies physics. **Renewable energy engineer:** works on environmentally-conscious energy production.			