Science Scheme of Work

Early Years

Overview of Topics

	Autumn		Spring		Summer	
	Cycle 1	**Cycle 2**	**Cycle 1**	**Cycle 2**	**Cycle 1**	**Cycle 2**
Topic	Into the Woods	Food and Festivals	All About Me	Imaginary Worlds	In the Garden	About Town
Areas Covered	Plants Habitats Animals Materials	Plants Materials Habitats	Animals including Humans	Materials	Plants Animals Habitats	Materials Habitats
	Seasons					
Curriculum Enrichment	• Forest School • Garden Classroom • Highgate Woods • Local Park	• Forest School • Garden Classroom • Market/Shop visit • Cooking workshop	• Forest School • City Farm • Doctor/Nurse/Midwife visit	• Forest School • Garden Classroom	• Forest School • Hampstead Heath • Pond Dipping • Local Park	• Forest School • Local Area walk • London zoo • Garden Classroom
Inspirational Scientists	*Ben Williams* *Tree Surgeon* 	*Adam Henson* *Farmer* 	*Dr Ronx* *Doctor* 	*Dr Emma Nicholls* *Palaeontologist* 	*Tayshan Hayden-Smith* *Gardener* 	*Roma Agrawal* *Engineer* 

Linked Topics:	Year	EYFS	Topic	Plants
Into the Woods Food and Festivals In the Garden	• Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
Name some plants and identify where they might be found growing, Use our senses to find out about the plants and other natural objects around us Identify similarities and differences between plants and other natural objects and sort into groups To observe plants and other natural objects closely and to describe them using simple scientific language. Explore through practical activities and books the life cycle of some plants. Understand some foods come from plants. Identify changes to plants through the seasons, as they grow and when they are cooked. Use our senses as appropriate (smell, touch, taste, sight) to identify plants e.g. flowers, herbs, fruit and vegetables Know some plants are not safe to eat and identify they should ask an adult if something is safe to eat.	• Can identify some plants that grow in different habitats e.g. a garden, in woodland • Can make simple comparisons between different plants • Can make simple observations and drawings of plants during first hand experiences of different habitats • Can identify some plants using books and information charts • Can talk about different plants that they come across in books, pictures and stories and make some simple comparisons. • Can observe changes to plants e.g. trees develop buds, leaves change colour, flowers bloom in spring • Can explain in simple terms e.g. ordering pictures simple life cycles of familiar plants from practical growing experiences e.g. growing beans or sunflowers • Can explain in simple terms some things plants need to grow • Can understand that some food they eat comes from plants • Can recognise and name some fruits and vegetables • Can identify some features of different fruit and vegetables e.g. they have a single seed or lots of seeds. • Can identify simple changes that happen to plants when they cook with them e.g. they become softer • Can use their senses appropriately to explore plants and describe them • Can understand that not all plants are safe to eat

Key vocabulary
Plants – tree, flower, bush, bud, stem, leaf Trees - oak, fir, beech, willow, horse chestnut, pear, lilac Flowers – bluebell, daffodil, crocus, snowdrop Fruit – pear, plum, apple, orange, strawberry, cherry, grape, cucumber, tomato, melon, banana Vegetables – bean, squash, pumpkin, potato, carrot, broccoli, turnip Natural objects - leaf/leaves, bark, trunk, twig, stick, seeds, nuts, acorn, conker, pine cone, berries, stones, soil, mud Growing – rain, sun, change, grow Senses - touch, smell, sight

Common misconceptions
Some children may think: • Vegetables and fruit are the same thing • Trees are not plants • All natural objects are plants

Topic: Into the Woods Term: Autumn Cycle 1	
Learning Objectives	**Working Scientifically Skills**
• Notices changes in and around the environment. • Able to talk about and label the different seasons. • Able to identify seasons through observation (Autumn/Winter focus). • Comments on changes they notice in and around the environment – colours and patterns. • Able to use books, media, pictures, ICT to identify different aspects in their natural environment.	• Comments and asks questions about the environment. • Observes, labels and identifies aspects of the natural environment. • Makes marks, drawings and recordings of what they have observed. • Uses ICT/non-fiction books to seek information.

Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible Evidence**
• Visit to Highgate Woods, looking for signs of Autumn, seasonal changes, look at patterns, colours and textures in the environment. • Forest school sessions to build up interest, care and concern for the natural living world – leaf hunt, Autumn planting, patterns in nature, changes in nature. • Observational drawings of plants, natural objects, bugs etc. • Leaf printing and printing with other natural objects, bark rubbings etc. • Explore the different weathers – rain collectors (measuring), wind mills and kites, exploring shadows. • Use non-fiction books and technology to find out about the natural world (trees, plants etc). • Cook with seasonal foods and explore where they come from and promote healthy eating and lifestyles. • Using iPads/cameras to take photos and record changes in nature (Leaf app or Picture This app to identify trees and plants).	• Observe children's ability to label and identify aspects of their environment. • Children notice and are able to talk about changes in the environment. • Observations of children's talk and language about the environment, in their learning environment, during trips, workshops and Forest School sessions.

Topic: Food and Festivals Term: Autumn Cycle 2	
Learning Objectives	**Working Scientifically Skills**
• Notices changes in and around the environment. • Able to talk about and label the different seasons. • Able to identify seasons through observation (Autumn/Winter focus). • Comments on changes they notice in and around the environment – colours and patterns. • Identifies different fruits and vegetables and able to differentiate the two groups. • Can talk about where fruit and vegetables come from. • Able to use books, media, pictures, ICT to identify different aspects in their natural environment.	• Observes, labels and identifies different fruits and vegetables/plants. • Makes marks, drawings and recordings of what they have observed. • Sorts and differentiates. • Identifies and labels simple plant life cycle/changes in plant life. • Uses ICT/non-fiction books to seek information.

Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible Evidence**
• Explore seasonal changes – Autumn and Winter • Explore different weather and how this affects the environment (growing). • Cooking activities and workshops – fruit salad, focus on using harvested foods. Children talk about the foods and where they come from. • Sorting fruit and vegetable activities.	• Observe children's ability to label and identify fruits and vegetables. • Children notice and are able to talk about where fruits and vegetables come from, and how they grow. • Observations of children's talk and language about the environment, in their learning environment, during trips, workshops and Forest School sessions.

• Planting and harvesting foods – talking and learning about where fruit and vegetables come from, how they grow etc. • Forest School – planting and looking at how foods grow. Looking at seasonal changes.	• Demonstrates understanding of simple plant life cycle.
Topic: In the Garden Term: Summer Cycle 1	
Learning Objectives	**Working Scientifically Skills**
• Notices changes in and around the environment. • Able to talk about and label the different seasons. • Able to identify seasons through observation. • Comments on changes they notice in and around the environment – colours and patterns, growth and decay etc. • Identifies different fruits and vegetables and able to differentiate the two groups. • Can talk about and demonstrate where fruit and vegetables come from, how they grow etc. • Able to use books, media, pictures, ICT to identify different aspects in their natural environment, as well as to seek new information.	• Observes, labels and identifies different plants, fruits and vegetables. • Makes marks, drawings and recordings of what they have observed. • Sorts and differentiates. • Plants and promotes growth of plant. • Identifies and labels simple plant life cycle/changes in plant life. • Uses ICT/non-fiction books to seek information.
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible Evidence**
• Visit to Hampstead Heath nature reserve. • Garden classroom workshop. • Growing plants and gardening – looking at the life cycle of a plant. • Cooking with food they have grown • Creating a sensory garden – designing and planting herbs, scented plants • Growing beans, sunflowers or other fast growing plants. • Investigating mould and decay. • Investigating fruit and vegetables e.g. looking at different seeds, using senses to explore etc. • Finding out where in the world fruit and vegetables come from • Mud Pie Kitchen sensory activities. • Look at a metre square in the school grounds and see what you can find. Record what they find where. • Go on a sensory walk in the garden or park. What can they see, hear, touch, smell etc.Talk about what they heard, saw, smelt, felt and where.	• Observe children's ability to label and identify aspects of their environment, trees, plants etc. • Children notice and are able to talk about changes in the environment, and about where fruits and vegetables come from, and how they grow. • Observations of children's talk and language about the environment, plant life cycles, growing and harvesting, in their learning environment, during trips, workshops and Forest School sessions. • Demonstrates understanding of simple plant life cycle.

Linked Units:	Year	EYFS	Topic	Animals, including humans
Autumn Cycle 1 - Into the Woods Spring Cycle 1- All About Me Autumn Cycle 2 - Food and Festivals Summer Cycle 1 - In the Garden	• Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
Comments on how and where different animals live in the environment and around the world. Shows care and concern for animals and their environment. Shows some understanding of different animal groups (ocean, polar, woodland, nocturnal etc). Able to identify and label a simple animal life cycle, including human. Able to talk about changes in the body during exercise. Can label different parts of the body. Demonstrates understanding of the importance of living a healthy lifestyle.	• Can name a range of animals that can be found in a woodland habitat. • Can describe some features of these named animals. • Can identify where woodland animals live e.g. a nest, a burrow etc. • Can label a simple animal life cycle (butterfly, frog, chick). • Can talk about changes happening during a life cycle. • Can label a simple human life cycle. • Identifies and can talk about similarities and differences between animals, humans, babies, children, adults, elderly etc. • Describes changes to the body when doing exercise. • Can label different parts of the body and knows what their function is. • Demonstrates understanding of the importance of living a healthy lifestyle.
Key vocabulary	
Life cycle – hatch, grow, cycle, transform, change, born/birth, death/decay Body – breathing, heart, exercise, healthy, lifestyle Different body parts – facial features, leg, arm, knee, etc. Animals/groups – ocean, rainforest, polar, desert, woodland, nocturnal etc.	

Common misconceptions

Some children may think:
- Humans are not animals
- All animals live in the same way

Topic: Into the Woods Term: Autumn Cycle 1	
Learning Objectives	**Working Scientifically Skills**
• Notices changes in and around the environment. • Able to talk about and label the different seasons. • Able to identify seasons through observation (Autumn/Winter focus). • Comments on how and where different animals live in the environment. • Shows care and concern for animals and their environment. • Shows some understanding of different animal groups (minibeasts, birds, woodland, nocturnal etc). • Able to use books, media, pictures, ICT to identify different aspects in their natural environment.	• Comments and asks questions about the environment. • Observes, labels and identifies aspects of the natural environment. • Makes marks, drawings and recordings of what they have observed. • Uses ICT/non-fiction books to seek information.
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Forest school sessions to build up interest, care and concern for the natural living world – bug hunt, leaf hunt, bird feeders, Autumn planting, patterns in nature, changes in nature. • Observational drawings of plants, natural objects, bugs etc. • Use non-fiction books and technology to find out about the natural world (nocturnal animals, bugs/minibeasts, birds, woodland animals, city animals). • Using iPads/cameras to take photos and record changes in nature and record bug finds etc.	• Observe children's ability to label and identify aspects of their environment. • Children notice and are able to talk about changes in the environment. • Children are able to label, identify and talk about different animal groups, such as nocturnal animals. • Observations of children's talk and language about animals and the environment, in their learning environment, during trips, workshops and Forest School sessions.
Topic: All About Me Term: Spring Cycle 1	
Learning Objectives	**Working Scientifically Skills**
• Notices similarities and differences in theirs and others bodies. • Notices changes to the body during exercise (breathing, heart rate etc). • Comments on changes they notice in and around the environment – body parts, bodily changes, growth and decay etc. • Demonstrates understanding of living a healthy lifestyle. • Talks about healthy eating, healthy bodies, lifestyle etc. • Able to label different parts of the body. • Able to talk about the function of different parts of the body. • Able to use books, media, pictures, ICT to identify body parts, simple life cycles, as well as to seek new information.	• Comments and asks questions about themselves and others. • Observes, labels and identifies changes in the body (eg. during exercise). • Labels a simple life cycle. • Labels and identifies body parts. • Sorts and differentiates. • Makes marks, drawings and recordings of what they have observed. • Uses ICT/non-fiction books to seek information.

Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Doctor/Nurse/Midwife visit – talking about healthy bodies, parts of the body etc. • Labelling different parts of the human body. • Looking at simple life cycles of the human and other animals, making comparisons. • City farm trip • Cooking activities promoting healthy eating/lifestyles. • Investigating our bodies e.g. looking at skeleton, x rays, labelling parts of the body, taking photos, comparing similarities and differences, hand and foot printing. • PD activities – observing changes in the body when we exercise (breathing, heart rate, sweating etc.)	• Labels and identifies different parts of the body. • Demonstrates understanding of healthy lifestyles and healthy eating – active, food choices, changes in the body etc. • Makes marks, drawings and recordings of what they have observed. • Sorts and differentiates – different life cycles. • Understanding of growth and decay. • Able to talk about changes in the body, for example a change in heart rate/breathing during exercise. • Uses ICT/non-fiction books to seek information.
Topic: In the Garden **Term: Summer Cycle 1**	
Learning Objectives	**Working Scientifically Skills**
• Notices changes in and around the environment. • Able to talk about and label the different seasons. • Able to identify seasons through observation. • Comments on changes they notice in and around the environment – colours and patterns, growth and decay etc. • Identifies different fruits and vegetables and able to differentiate the two groups. • Can talk about and demonstrate where fruit and vegetables come from, how they grow etc. • Able to use books, media, pictures, ICT to identify different aspects in their natural environment, as well as to seek new information.	• Observes, labels and identifies different plants and animal groups in the environment. • Makes marks, drawings and recordings of what they have observed. • Sorts and differentiates. • Understanding of growth and decay. • Identifies and labels simple animal life cycles/changes in animal life and habitats. • Uses ICT/non-fiction books to seek information.
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Visit to Hampstead Heath nature reserve. • Farm trip looking at animal groups and their habitats. • Garden classroom workshop. • Pond dipping – looking at plant life, and animals in their habitats. • Looking at life cycles e.g. butterfly, frogs, chicks. • Building dens in the garden. • Building bird and bug houses.	• Observe children's ability to label and identify aspects of their environment, animal groups, habitats, plants etc. • Children notice and are able to talk about changes in the environment looking at growth and decay, habitats and animal life cycles. • Observations of children's talk and language about the environment, animal life cycles, growing and harvesting, decay, in their learning environment, during trips, workshops and Forest School sessions. • Demonstrates understanding of simple life cycles. • Shows care and concern for the living environment.

Topic: Food and Festivals Term: Autumn Cycle 2	
Learning Objectives	**Working Scientifically Skills**
• Able to talk about and label the different animals/groups. • Comments on how and where different animals live in the environment. • Makes comparisons with different animal groups around the world. • Shows care and concern for animals and their environment. • Shows some understanding of different animal groups, particularly from other parts of the world (safari, jungle, polar, ocean etc). • Able to use books, media, pictures, ICT to seek new information.	• Observes, labels and identifies different animal groups from around the world. • Makes marks, drawings and recordings of what they have observed. • Sorts and differentiates. • Makes comparisons. • Uses ICT/non-fiction books to seek information.
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Find out where different animals live around the world and locate on a map – sort into animals that live in hot places, cold places, rain forests, woodland, the ocean etc. • Farm visit – looking at animal groups, making comparisons with animals around the world. • Forest school – minibeast hunt, making comparisons with animals around the world.	• Children are able to talk about different animal groups from around the world, where they come from etc. • Children can talk about similarities and differences between different habitats of animals from around the world.

Linked Units:	Year	EYFS	Topic	Materials
Autumn Cycle 1 – Into the Woods Autumn Cycle 2 – Food and Festivals Spring Cycle 2 - Imaginary Worlds Summer Cycle 2 – About Town	• Explore collections of materials looking at similar and different properties, talking about differences in materials and the changes they notice. • Explore how things work. • Explore and talk about different forces relating to materials (pushing, pulling, magnets, water, stretching etc). • Explore changes in the natural world (melting, freezing, floating, sinking, light, dark etc).			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
Notices changes that happen in and around their environment. Explores different materials and their properties. Makes comparisons between different materials/textures. Explores different changes in state. Explores different forces. Talks about changes they notice with: - Floating and sinking - Melting and freezing - Light and dark - Magnetic materials	• Demonstrates curiosity with different materials and textures. • Can describe and compare different materials and textures. • Selects appropriate materials to complete a task. • Engages in practical investigations and experiments. • Can talk about changes they notice during practical tasks. • Able to label changes that are happening during practical tasks. • Can describe and make sense of changes that occur. • Relates what they have observed to other experiences. • Uses previous learning to build, explore and extend their own learning. • Problem solves and seeks to find solutions. • Uses ICT equipment to seek information and record their learning. • Uses non-fiction texts to seek information.
Key vocabulary	
Senses – touch, feel, smell, see, look, taste, hear, listen Feel – smooth, rough, prickly, bumpy, coarse, slimy, squidgy, soft, fluffy, hard, cold, wet, dry Forces – push, pull, stretch, tight, float, sink, heavy, light, magnet/ic etc. Changes – melt/ing, freeze/ing, ice, cook, bake, liquid/wet, solid/hard etc.	
Common misconceptions	
Children may think that: • Materials are always fabric/clothing	

Topic: Into the Woods Term: Autumn Cycle 1	
Learning Objectives	**Working Scientifically Skills**
• Notices and observes natural materials in the environment. • Able to identify different natural materials. • Makes comparisons between different materials. • Notices and talks about colours, textures etc. • Notices changes in weather and the affects this has (looking at change in light, water levels etc).	• Makes observations of materials in their natural environment. • Labels and identifies different materials. • Describes different materials. • Compares different materials. • Makes marks, drawings and recordings of what they have observed. • Sorts and differentiates. • Uses ICT/non-fiction texts to seek information. • Uses ICT equipment to record information.
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Visit to Highgate Woods, looking for signs of Autumn, seasonal changes, look at patterns, colours and textures in the environment. • Leaf printing and printing with other natural objects, bark rubbings etc. • Explore the different weathers – rain collectors (measuring), wind mills and kites, exploring shadows.	• Demonstrates curiosity of materials around the environment. • Can talk about different materials and what they look, feel like etc. • Can describe weather changes. • Talks about similarities and differences between materials (considering textures, colours etc).
Topic: Food and Festivals Term: Autumn Cycle 2	
Learning Objectives	**Working Scientifically Skills**
• Notices seasonal changes. • Describes aspects of each season. • Notices changes in weather and the affects this has (looking at change in light, water levels, melting/freezing etc). • Understands the process of melting and freezing. • Able to talk about changes they notice when cooking.	• Observes, labels and identifies different materials. • Describes and records changes they notice. • Compares different materials. • Makes marks, drawings and recordings of what they have observed. • Sorts and differentiates. • Uses ICT/non-fiction texts to seek information. • Uses ICT equipment to record information.
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Explore seasonal changes. • Explore different weather – patterns and changes (measuring, light, freezing, melting). • Cooking activities – explore changes that take place when cooking different foods e.g. changes of state.	• Demonstrates curiosity around weather changes (eg. melting/freezing). • Can talk about weather changes they notice (eg. melting/freezing). • Can talk about and explain changes during cooking/baking tasks. • Notices and talks about patterns around the environment. • Labels and describes colours, patterns, textures etc.

Topic: Imaginary Worlds Term: Spring Cycle 2	
Learning Objectives	**Working Scientifically Skills**
• Notices changes in state (dissolving, melting etc.) • Explores different materials and their properties. • Labels and can describe textures of different materials. • Makes comparisons between different textures. • Able to talk about changes they notice when cooking. • Explores different forces and changes around their environment. • Talks about changes they notice with: - Floating and sinking - Melting and freezing - Light and dark - Magnetic materials	• Observes, labels and identifies different materials. • Describes and records changes they notice. • Compares different materials. • Makes marks, drawings and recordings of what they have observed. • Sorts and differentiates. • Takes part in practical problem solving and scientific experiments. • Uses ICT/non-fiction texts to seek information. • Uses ICT equipment to record information.
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Investigate dissolving, mixing and melting. • Cooking activities which demonstrate change e.g. making bread, jelly, ice lollies, cakes. • Exploring senses e.g. feely bags, food tasting, texture collages, making instruments, sensory play etc. • Exploring floating and sinking. • Explore mixing materials e.g. make magic potions, using water play, mud kitchen, malleable materials, make wave jars/magic bottles/fairy jars – mixing oil, water and food colouring. • Explore chemical reactions and change e.g. make volcanoes, exploding paint, growing crystals. • Find out about dinosaurs – look at non-fiction texts, explore fossils. • Use metal detectors and magnets to find out about properties of materials e.g. make a fishing game, hunt for buried treasure. • Make boats and explore properties of materials.	• Demonstrates curiosity with different materials and textures. • Can talk about different textures. • Can describe and compare different materials. • Engages in practical investigations and experiments. • Can talk about changes they notice during practical tasks (cooking, mixing, melting etc). • Notices and talks about patterns and change around the environment. • Able to label changes that are happening during practical tasks. • Can describe and make sense of changes that occur. • Relates what they have observed to other experiences.
Topic: About Town Term: Summer Cycle 2	
Learning Objectives	**Working Scientifically Skills**
• Notices changes in state (dissolving, melting etc.) • Explores different materials and their properties. • Observes changes that happen around their environment. • Explores different forces and changes that happen. • Creates mechanisms that explore different forces (pushing, pulling etc).	• Observes, labels and identifies different materials. • Describes and records changes they notice. • Compares different materials. • Makes marks, drawings and recordings of what they have observed. • Sorts and differentiates.

• Talks about changes they notice with: - Floating and sinking - Melting and freezing - Light and dark - Magnetic materials	• Takes part in practical problem solving and scientific experiments. • Investigates outcomes through trial and error and using previous learning. • Problem solves. • Uses ICT/non-fiction texts to seek information. • Uses ICT equipment to record information.
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Design and make a playground (small/ large scale) using blocks, PE equipment, loose parts, woodwork – explore forces, pushes and pulls. • Explore materials, sinking and floating, pushes and pulls and forces – make balloon cars, windmills, rockets, parachutes, roll vehicles down different slopes, make boats, explore pulleys and channels in sand and water play, create building sites.	• Demonstrates curiosity with different materials and textures. • Can describe and compare different materials. • Selects appropriate materials to complete a task. • Engages in practical investigations and experiments. • Can talk about changes they notice during practical tasks. • Able to label changes that are happening during practical tasks. • Can describe and make sense of changes that occur. • Relates what they have observed to other experiences. • Uses previous learning to build, explore and extend their own learning. • Problem solves and seeks to find solutions.

Studied across the year	Year	EYFS	Topic	Seasonal changes
	• Observe changes across the four seasons.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
Children can identify, label and describe the different seasons. They can talk about changes they notice in relation to the seasons. They can talk about weather changes and how these relate to the seasons.	• Able to identify the different seasons. • Talks about the different seasons in some detail. • Notices changes in the environment and links these changes to the seasons. • Observes and talks about weather changes. • Describes the cycle of a year (seasons) and understands that the seasons are a cycle. • Demonstrates understanding of the need for seasons.
Key vocabulary	
Seasons – Spring, Summer, Autumn, Winter Spring – buds, blossom, shoot, light, growth, chicks, lambs (baby animals), sun, rain, warm, plant, seed Summer – sun, hot, warm, green, luscious, rich, leaves, flowers, animals, bugs (bees, butterfly etc.) Autumn – change, fall, decay, colours (yellow, orange, red, brown, gold), hibernate, cold, rain Winter – decay, cold, rain, freeze, ice, bleak, dark Weather – sun/ny, hot, warm, rain, wet, cold, freeze, ice, melt, snow, cloud, storm, hail, lightening, thunder, rainbow, fog, drizzle	

Common misconceptions
Some children may think: • That it doesn't rain during Summer/it isn't sunny in Winter. • It's always hot in Summer/always snows in Winter.

Learning Objectives	**Working Scientifically Skills**
• Identifies the different seasons. • Labels and describes the different seasons. • Talks about changes that happen during the changing seasons. • Understands the need for seasons. • Understands that weather changes during the changing seasons.	• Observes, labels and identifies the seasons. • Describes and records changes they notice. • Compares the seasons. • Makes marks, drawings and recordings of what they have observed. • Uses ICT/non-fiction texts to seek information. • Uses ICT equipment to record information.

Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Visit to Highgate Woods, Hampstead Heath, local park trips to: look for signs of Autumn, Winter Spring, Summer, seasonal changes, look at patterns, colours and textures in the environment. • Forest school sessions to build up interest, care and concern for the natural living world – talk about changes in the environment and how they link to the different seasons throughout the year. • Explore seasonal changes over the year – Autumn, Winter, Spring, Summer • Explore different weather and how this affects the environment – relate to the seasons. • Sorting seasonal fruit and vegetable activities. • Planting and harvesting foods – talking and learning about seasonal fruit and vegetables. • Planting and looking at how foods grow. Looking at seasonal changes. • Spring changes – looking at life cycles and new growth. • Autumn/winter changes – looking at fall, change and decay.	• Able to identify the different seasons. • Talks about the different seasons in some detail. • Notices changes in the environment and links these changes to the seasons. • Observes and talks about weather changes. • Describes the cycle of a year (seasons) and understands that the seasons are a cycle. • Demonstrates understanding of the need for seasons.

Linked Units:	Year	EYFS	Topic	Living things and their habitats
Autumn Cycle 1- Into the Woods Autumn Cycle 2 – Food and Festivals Summer Cycle 1 – In the Garden	• Explores the natural world around them, making observations and drawing pictures of living things and their habitats. • Knows some similarities and differences between different habitats, animal and plant species.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
Notice changes in and around their environment, looking at plant life, animals and their habitats. Identifies different animal groups (ocean, woodland, minibeasts, nocturnal etc.) and can talk about where/how they live. Identifies different habitats and can make comparisons between them. Can talk about different life cycles. Shows care and concern for the living world. Can talk about where fruit and vegetables come from, how they grow etc. Understands that ICT/non-fiction books can be used to seek information.	• Children will be able to talk about what they have observed in and around their environment. • Can identify different animal groups (from around the world) and talk about their similarities and differences. • Can make comparisons between different habitats. • Talks about and explains different life cycles of plants and animals. • Explores and demonstrates care for the living environment. • Demonstrates understanding that fruit and vegetables are grown. • Uses ICT equipment to record their observations. • Uses ICT/non-fiction texts to seek information.
Key vocabulary	
Habitat – living, grow, survive, climate, food, shelter Various animal names Animal groups – nocturnal, woodland, ocean, rainforest, minibeasts etc.	
Common misconceptions	
Some children may think: • All habitats are the same • Plants are not living things • Habitats don't include plant life	

Topic: Into the Woods Term: Autumn Cycle 1	
Learning Objectives	**Working Scientifically Skills**
• Able to identify different animal groups (minibeasts, birds, woodland, nocturnal etc). • Can talk about animal habitats. • Notices similarities and differences between animal habitats. • Comments on how and where different animals live in the environment. • Shows care and concern for animals and their environment. • Uses ICT/non-fiction books to seek information. • Uses ICT equipment to record observations.	• Comments on and questions what they have observed. • Identifies and labels different animal groups. • Describes and compares different habitats. • Makes comparisons. • Makes marks, drawings and recordings of what they have observed. • Uses ICT/non-fiction books to seek information. • Uses ICT equipment to record their findings.
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Forest school sessions to build up interest, care and concern for the natural living world – bug hunt, bird feeders, dens, minibeasts and habitats. • Observational drawings of different habitats, bugs etc. • Use non-fiction books and technology to find out about different animals (nocturnal animals, bugs/minibeasts, birds, woodland animals, city animals). • Using iPads/cameras to take photos and record bug finds etc. • Using bug catchers to make observations. • Visit to Highgate Woods, looking at animal habitats.	• Shows an interest in finding bugs and discovering in the natural environment. • Names different animals. • Able to talk about animal habitats, where they live etc. • Able to make comparisons between different animal groups and their habitats. • Uses books and ICT equipment to find out information.
Topic: In the Garden Term: Summer Cycle 1	
Learning Objectives	**Working Scientifically Skills**
• Comments on changes they notice in and around the environment – colours and patterns, growth and decay etc. • Able to identify different animal groups (minibeasts, birds, woodland, nocturnal etc). • Can talk about animal habitats. • Can label a simple plant/animal life cycle. • Can talk about and demonstrate where fruit and vegetables come from, how they grow etc. • Describes life cycles of different animals and plants. • Notices similarities and differences between animal habitats. • Comments on how and where different animals live in the environment. • Shows care and concern for living things and their environment. • Uses ICT/non-fiction books to seek information.	• Comments on and questions what they have observed. • Identifies and labels different animal groups. • Describes and compares different habitats. • Makes comparisons. • Observes and labels a plant life cycle. • Observes and labels an animal life cycle. • Makes marks, drawings and recordings of what they have observed. • Uses ICT/non-fiction books to seek information. • Uses ICT equipment to record their findings.

• Uses ICT equipment to record observations.	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Visit to Hampstead Heath – looking at habitats in the environment. • Farm trip looking at animal groups and their habitats. • Pond dipping – looking at plant life, and animals in their habitats. • Looking at life cycles e.g. flower, butterfly, frogs, chicks. • Building dens in the garden. • Building bird and bug houses. • Go on a sensory walk in the garden or park. What can they see, hear, touch, smell etc.	• Shows an interest in finding bugs and discovering in the natural environment. • Able to talk about animal habitats, where they live etc. • Able to make comparisons between different animal groups and their habitats. • Can identify, label and describe the changes of an animal life cycle. • Can talk about different animal habitats and makes comparisons. • Uses books and ICT equipment to find out information.
Topic: Food and Festivals Term: Autumn Cycle 2	
Learning Objectives	**Working Scientifically Skills**
• Able to talk about and label the different animals/groups. • Comments on how and where different animals live in the environment. • Makes comparisons with different animal groups around the world. • Shows care and concern for living things and their environment. • Shows some understanding of different animal groups, particularly from other parts of the world (safari, jungle, polar, ocean etc). • Able to use books, media, pictures, ICT to seek new information.	• Observes, labels and identifies different animal groups from around the world. • Makes marks, drawings and recordings of what they have observed. • Sorts and differentiates. • Makes comparisons. • Uses ICT/non-fiction books to seek information.
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**
• Find out where different animals live around the world and locate on a map – sort into animals that live in hot places, cold places, rain forests, woodland, the ocean etc. • Farm visit – looking at animal groups, their habitats, and making comparisons with animals around the world. • Forest school – minibeast hunt, habitats, and making comparisons with animals around the world.	• Children are able to talk about different animal groups from around the world, where they come from, habitats etc. • Children can talk about similarities and differences between different habitats of animals from around the world.

Year 1

Overview of Topics

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
NC Programme of Study	• Animals Including Humans	• Everyday Materials	• Plants including Trees • Seasonal Changes		• Animals Including Humans Revisit	• Plants – Revisit • Animals including humans- 2nd Revisit
	Seasonal Changes					
Number of Lessons	• Essential – 5 • Enrichment – 1	• Essential – 4 • Enrichment – 2	• Essential – 4 • Enrichment – 2 • Essential – 2 • Enrichment - 1		• Revisit - 3	• Revisit – 3 • Revisit - 3
Working Scientifically Lesson	• Observation		• Performing Simple Tests • Science Fair Project		• Gathering and Recording Data	
Curriculum Enrichment			• Natural History Museum	• Forest School • Trees please Me • Highgate Woods Fieldwork • Science Fair	• Beach fieldwork	
Inspirational Scientists	*Danielle Johnson Clinical Scientist in Neurophysiology* 	*Jyoti Sehdev Senior Civil engineer* 	*Mary Anning*  *Emma Dunne Palaeobiologist*	*David Attenborough*  *Mya Rose Craig Ornithologist and Environmentalist*	*Jemma Dias Animal Behaviour and Welfare Scientist*  *Dawood Qureshi Marine biologist*	*Pauline de Bigault de Cazanove Environmental Chemist* 

			 **Women in Science Day** *Ada Lovelace* 			

Spring Term	Year	1	Topic	Plants

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

Linked Prior Learning

- Explore the natural world around them, making observations and drawing pictures of animals and plants
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible Evidence
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 while other trees drop their leaves during autumn and grow them again during spring.	• 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

Key vocabulary

Bud, trunk, branch, bark, seed, wild	Nutrients, stem, deciduous, evergreen

Key Questions

- What are the parts of a plant?
- What are wild plants and where do you find them?
- What are garden plants and where do you find them?
- What makes a tree?
- What types of tree are there? (Trees that live around my school)
- What's the difference between trees?

Common misconceptions

Some children may think:

- plants are flowering plants grown in pots with colored petals and leaves and a stem
- trees are not plants
- trees get food from their roots
- all trees are the same
- all leaves are green
- all stems are green
- a trunk is not a stem
- blossom is not a flower.

Autumn Term	Year	1	Topic	Animals, including humans

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

Linked Prior Learning

- Explore the natural world around them, making observations and drawing pictures of animals and plants
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
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.	• 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

Key vocabulary	
Blood, senses, young, feathers, fur, scales	Mammal. Amphibian, reptile, herbivore, carnivore, omnivore

Key Questions

- What is an animal?
- What types of animals are there?
- What is similar and what is different?
- What does food tell us about an animal?
- What makes me an animal? What senses do I have?

Common misconceptions

Some children may think:

- only four-legged mammals, such as pets, are animals
- humans are not animals
- insects are not animals
- whales are fish
- all ‘bugs’ or ‘creepy crawlies’, such as spiders, are part of the insect group
- amphibians and reptiles are the same.
- Reptiles don’t have skeletons

Autumn Term	Year	1	Topic	Everyday materials
	• Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their simple physical properties.			
	Linked Prior Learning			
	• Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. • Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function; Share their creations, explaining the process they have used;			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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.	• Can label a picture or diagram of an object made from different materials • Can describe the properties of different materials
Key vocabulary	
Absorb, rough, smooth, waterproof, metal, plastic	Materials, properties, flexible, transparent, opaque, physical
Key Questions	
• What are materials? • What are things made of in school? • How can I describe materials? • Which materials are waterproof and which are not? • Which materials are transparent and which are opaque? • What's the best material for the job? Why?	
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.
- All shiny things are metal
- Bricks and cement are rock

Spring Term	Year	1	Topic	Seasonal changes
	• Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies.			
	Prior Learning			
	• Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
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.	• 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

Key vocabulary

Dawn, dusk, mild, rotate, soaked. weather	Month, season, spring, summer, autumn, winter

Key Questions

- What are the four seasons?
- What's the weather like in spring, summer, autumn and winter?
- Why does day become night?

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.
- seasons are the same all over the world

Working Scientifically

Year 2

Overview of Topics

	Autumn 1	Autumn 2	Spring 1 Spring 2	Summer 1	Summer 2
NC Programme of Study	• Animals Including Humans	• Uses of Everyday Materials	• Living things and their Habitats • Revisit Living things and their habitats – Everyday materials	• Plants	• Revisit – Plants and Animals Including Humans
Number of Lessons	• Essential – 5 • Enrichment - 1	• Essential – 4 • Enrichment - 2	• Essential – 4 • Enrichment – 2 • Revisit - 2	• Essential – 4 • Enrichment - 2	• Revisit - 3
Working Scientifically Lesson	• Comparing and • classifying	• Asking simple questions	• Science Fair Project		• Using observations
Curriculum Enrichment	• Science Museum		• Camley Street Natural Park or Heath Beasts • Science Fair	• Sunflower competition	• Garden Classroom Session – Pizza Plot
Inspirational Scientists	*Eliza Hunt* *Chemist*  *Broc Drury* *Immunologist* 	*Dr Pearl Agyakwa* *Materials scientist*  *Dr Raquel Prado* *Renewable* *Materials Engineer*	*Dr Ben Woodcock* *Ecological entomologist*  **Women in Science Day** *Dr Hyat Sindi* *Scientist and innovator*	*Mary Seacole-* *Botanist*  *Rachel Carson-* *Marine Biologist and* *Conservationist*	*Tim Spector - Professor of Genetics, Author, and Co-Founder of ZOE Nutrition* 

Spring Term	Year	2	Topic	Living things and their habitat
	• Explore and compare the differences between things that are living, dead, and things that have never been alive • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • Identify and name a variety of plants and animals in their habitats, including micro-habitats • 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			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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 which plants and animals live there. The plants and animals in a habitat 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.	• 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
Key vocabulary	
Thrive, depend, producer, consume, prey, predator	Oxygen, nutrition, respiration, sensitivity, reproduction, excretment

Key Questions
• What is alive and what is not? • What do all living things have in common? • Where do plants and animals live? • What plants and animals live in our local environment? • What are food chains? How are they connected? • Why do plants and animals need each other?
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'. • A rock was once alive • Respiration means breathing

Summer Term	Year	2	Topic	Plants
	• Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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 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.	• 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
Key vocabulary	
Wither, dormant, mature, bulb, anchor, sustain	Germination, perennial, carbon dioxide, glucose, clone
Key Questions	
• How do seeds germinate and what happens? • What happens when bulbs sprout? • What do plants need to thrive and be healthy? • What can happen if plants don't get the things they need? • What do I notice about plants around the school? How are they healthy? How are they unhealthy? • How do seeds and bulbs grow?	
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. • a bulb does not grow back • when a bulb withers and the leaves die back, it is dead • trees are not plants	

Autumn Term	Year	2	Topic	Animals, including humans
	• Notice that animals, including humans, have offspring which grow into adults. • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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 the basic needs of feeding, drinking and breathing that must be satisfied in order to survive. 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.	• 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
Key vocabulary	
Healthy, survive, exercise, heart, lungs, msucles	Hygiene, larva, pupa, vertebrates, invertebrates, metamorphosis
Key Questions	
• REMEMBER: what is an animal? • How do animals change as they mature? • How do we change as we mature? • What do all animals need to stay alive? • Keeping healthy: why do we exercise? • Keeping healthy: why do we eat different types of food?	
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. • Humans are not animals • All animals are born looking like their parents • Humans don't change, we just get bigger. • We eat food to just fill ourselves up	

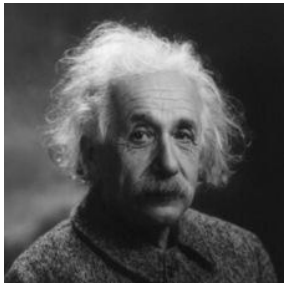
Autumn Term	Year	2	Topic	Uses of everyday materials
	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.			

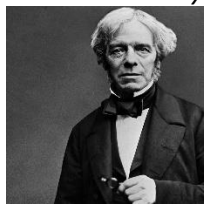
WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle 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.	• an 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
Key vocabulary	
Artificial, brittle, extracted, fabric, manufactured, natural	Ceramic, durable, inflexible, reflective, rigid, translucent

Key Questions
• What are materials used for? • What happens when we squash, bend, twist or stretch a material? • What's the right material for the job? • What's the most absorbent material? • Who invented waterproofing?
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. • bricks and concrete are rocks

Year 3

Overview of Topics

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
NC Programme of Study	• Animals Including Humans	• Forces and Magnets	• Rocks • Revisit Animals Including Humans		• Light • Revisit Rocks	• Plants
Number of Lessons	• Essential - 3	• Essential – 5 • Enrichment - 1	• Essential – 4 • Enrichment – 3 • Revisit -3		• Essential – 3 • Revisit - 3	• Essential – 5 • Enrichment - 1
Working Scientifically Lesson	• Comparative Tests	• Recording findings	• Science Fair Project			• Using data to draw simple conclusions
Curriculum Enrichment			• Science Fair • The Garden Classroom – The Rock Show or John Soames Museum • Geo bus session • Heath Learning- Soil Scientists			• Country Trust Trip to Farm • Camley Street – Plants or TGC How Plants Grow
	The Country Trust Project Food Discovery Programme Runs All Year					
Inspirational Scientists	*Dr Zoë Ayres* *Water Scientist* 	*William Gilbert* *Physicain, Physicist and Natural Philosopher* 	*Dr Fangxian Fang* *Earth scientist*  **Women in Science Day**		*Albert Einstein*  *Anna Atkins* *Botanist*	*Marie Clark Taylor* *Botanist*  *Dr. Tanisha Williams*

		Micheal Farraday *Natural philosopher who contributed to the study of electromagnetism and electrochemistry* 	*Maria Da Penha* *Bio pharmacist and Human Rights Defender* 		*Plant Scientist* 

Summer 2	Year	3	Topic	Plants
	• Identify and describe the functions of different parts of flowering plants: roots; stem/trunk; leaves; and flowers. • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. • Investigate the way in which water is transported within plants. • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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.	• 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
Key vocabulary	
Adapt, essential, glucose, transport, variety, vital	Transpiration, stoma, pollination, stamen, pistil, photosynthesis
Key Questions	
• What are the parts of a flowering plant? What do they do? • Do all plants need the same things to thrive and grow? • How do leaves make food for the plant? • How does water move through a plant? • What do flowers do? • What is pollination?	
Common misconceptions	
Some children may think: • a flower is the whole plant • fungi are plants • algae is a plant • a tree is not a plant • insects eat pollen	

- 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.

Autumn 1	Year	3	Topic	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. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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 – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. 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.	• 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

Key vocabulary	
Minerals, skeleton, skull, voluntary, involuntary, nerves	Biceps, triceps, vertebrae, vitamins, proteins, carbohydrates

Key Questions

- What effect does the food we eat have?
- Where is my skeleton and what does it do?
- Where are my muscles and what do they do?

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.
- our skeleton is one continuous bone in our body

Spring Term	Year	3	Topic	Rocks
	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. • Recognise that soils are made from rocks and organic matter.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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 pieces and the amount of organic matter affect the property of the soil. 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.	• 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
Key vocabulary	
Cemented, compacted, decay, prehistoric, soil, transform,	Fossil, igneous, magma, metamorphic, minerals, sedimentary
Key Questions	
• How are rocks formed? • What types of rocks are there? • Can rocks change? • How can we test a rock to see if it is limestone or chalk? • Is soil just dirt? What makes soil? • How are fossils formed?	
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’ • rocks don’t change • certain found artefacts, like old bits of pottery or coins, are fossils • a fossil is an actual piece of the extinct animal or plant • fossils are all the same • soil and compost are the same thing. • Soil is just dirt	

Summer 1	Year	3	Topic	Light
	• Recognise that they need light in order to see things, and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. • Find patterns in the way that the size of shadows change.			

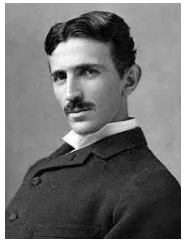
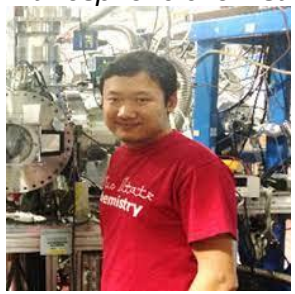
WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, 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.	• 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
Key vocabulary	
Absence, cast, impenetrable, reflect, shadow, source	Constant, dependent, independent, illuminate, translucent, variable
Key Questions	
• Do we need light to see things? Remember: what are light sources and what are not light sources? • How are shadows formed? • What happens to the size of a shadow when the object moves closer to, or away from, the light source?	
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 • light does not travel in straight lines when it reflects from a mirror • the moon and reflective surfaces are light sources • a transparent object is a light source • light travels from our eyes so we can see things • shadows contain details of the object, such as facial features on their own shadow • a shadow is a reflection • shadows result from objects giving off darkness.	

Autumn 2	Year	3	Topic	Forces and magnets
	• Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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.	• 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
Key Vocabulary	
Consequence, contact, force, attract, north, south	Magnet, resilience, friction, repel, pole, magnetci field
Key Questions	
• What are contact forces? • How do surfaces affect the motion of an object? • How does friction affect moving objects? • What is a noncontact force? How is this different to a contact force? • How do magnets attract and repel? • Which materials are magnetic?	
Common misconceptions	
Some children may think: • the bigger the magnet the stronger it is • all metals are magnetic.	

Year 4

Overview of Topics

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
NC Programme of Study	• Electricity	• Animals Including Humans	• States of Matter		• Sound	• Living Things and Their Habitats
Number of Lessons	• Essential – 3	• Essential – 2 • Enrichment - 1	• Essential – 5 • Enrichment - 1		• Essential – 3	• Essential – 5 • Enrichment - 1
Working Scientifically Lesson	• Identifying suitable types of enquiry	• Gather data in a variety of ways	• Science Fair Project		• Making systematic and careful-observations and measurements	•
Curriculum Enrichment		• Science Museum -	• Science Fair		• Music production workshop	• Camley Street – Animals session
Inspirational Scientists	Nikola Tesla 	*Dr Yogesh Kumar* *Applications Scientist* 	*Dr Rabi Chhantyal-Pun* *Atmospheric chemist*  *Dr Anwar Khan -* *Atmospheric scientist*		*Harriet Withey* *Clinical Scientist* *Audiology*  *https://www.greatsciencshare.org/find-a-scientist-biogs/harriet-withey*	*Tanesha Aleen* *Zoologist*  *Serian Sumner* *Behavioral ecologist* 

			 **Women in Science Day** *Tu You You – Chemist (First woman in China to receive Nobel prize)* 		

	Year	4	Topic	Living things and their habitats
	• Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. • Recognise that environments can change and that this can sometimes pose dangers to living things.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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.	• 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
Key Vocabulary	
Classification, environment, interdependence, interact, beneficial, hierarchy	Vertebrate, invertebrate, biotic, ecosystem, species, niche
Key Questions	
• What are the characteristics of living things? • What animals are vertebrates? • What groups are plants classified in? • What is classification? How do I use a key? • What happens if the environment in a habitat changes?	
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.	

	Year	4	Topic	Animals, including humans
	• Describe the simple functions of the basic parts of the digestive system in humans. • Identify the different types of teeth in humans and their simple functions. • Construct and interpret a variety of food chains, identifying producers, predators and prey.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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; and molars and premolars for grinding (chewing). Living things can be classified as producers, predators and prey according to their place in the food chain.	• 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
Key Vocabulary	
Expel, compact, digestion, acid, stomach, intestines	Incisor, canine, molar, enzyme, saliva, peristalsis
Key Questions	
• What teeth do humans have? What do they do? • How does our mouth and teeth help digestion? What's the process? • Can teeth tell us what animals eat?	
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 • the tongue has specific areas that detect certain tastes • when you have a meal, your food goes down one tube and your drink down another	

- there is one tube for eating and breathing
- the food you eat becomes “poo” and the drink becomes “wee”.
- There is one tube for faeces and one tube for urine

	Year	4	Topic	States of matter
	• Compare and group materials together, according to whether they are solids, liquids or gases. • Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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°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°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.	• 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

Key Vocabulary	
Permanent, particle, solid, liquid, gas, vapour	Evaporate, condense, melt, matter, state, volume

Key Questions

- What is matter? What does ‘state’ mean?
- What are solids, liquids and gases?
- Melting: how do materials change state?
- Evaporating: how do materials change state?
- Condensing: how do materials change state?
- Summary: how do materials change their state of matter?

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
- Water droplets on the outside of a cold can of drink have come from the inside

Year	4	Topic	Sound

- Identify how sounds are made, associating some of them with something vibrating.
- Recognise that vibrations from sounds travel through a medium to the ear.
- Find patterns between the pitch of a sound and features of the object that produced it.
- Find patterns between the volume of a sound and the strength of the vibrations that produced it.
- Recognise that sounds get fainter as the distance from the sound source increases.

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
A sound 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.	• 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

Key Vocabulary

Produce, property, source, frequent, regular, affect	Vibrate, pitch, volume, medium, vacuum, sound wave

Key Questions

- What is sound?
- How does sound travel?
- What is the pitch and loudness of sound?

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 only travels in straight lines
- sound can’t travel through solids and liquids
- sound cannot be heard underwater
- sound travels through the air as noise
- high sounds are load and low sounds are quiet.

	Year	4	Topic	Electricity
	• Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • 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. • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
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.	• 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

Key Vocabulary

Associate, identify, portable, effect, appliance, series	Component, electrical insulator, electrical conductor, circuit, hypothesis, variable

Key Questions

- What appliances use electricity? What sort of power makes them work? Notice it – what are the everyday appliances that run on electricity - battery or mains?
- Name it - what are the components in a simple series circuit? Test it – what happens when a circuit is open or closed?
- Diagnose it – what are the effects of changing circuit components and batteries?

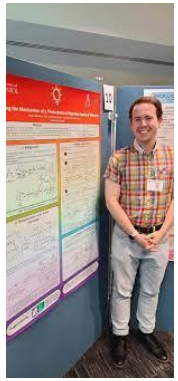
Common misconceptions

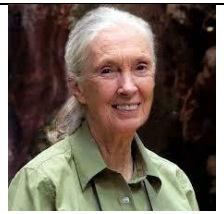
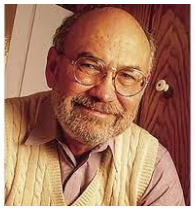
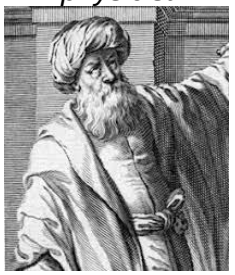
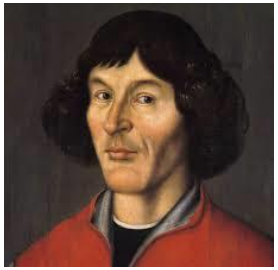
Some children may think:

- when you buy a device from the shop, the electricity is already inside it
- wire is made of plastic
- 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
- if a circuit is broken electricity goes off into the air.

Year 5

Overview of Topics

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
NC Programme of Study	• Living Things and their Habitats	• Materials and their Properties	• Forces • Revisit Living Things and their Habitats		• Animals Including Humans	• Earth and Space
Number of Lessons	• Essential – 5 • Enrichment – 1	• Essential – 4 • Enrichment - 2	• Essential – 5 • Enrichment – 1 • Revisit - 3		• Essential – 2 • Enrichment - 1	• Essential – 4 • Enrichment - 2
Working Scientifically Lesson		• Recognising and controlling variables	• Science Fair project		• Measuring accurately	• Drawing & explaining conclusions
Curriculum Enrichment						• TGC – Earth and Beyond • The Royal Observatory Greenwich
Inspirational Scientists	*Dr Kelsey Byers* *Evolutionary Biologist*  *Jane Goodall* *Primatologist*	*James Mortimer* *Photochemist*  *Spencer Silver* *Inventor of the Post It*	*Gallileo* *Astronomer, physicist and engineer,*  *Isaac Newton* *Mathematician, physicist, astronomer, alchemist*		*Dr Jo Montgomery* *Animal Behavioral Neuroscientist*  Link to Geography *Prem Singh Gill* *Polar scientist*	*Ptolemy* *Mathematician, astronomer, astrologer*  *Alhazen* *Mathematician, astronomer, and*

		 *Ruth Benerito – Chemist and inventor* 	 **Women in Science Day** *Gladys West – Mathematician (Development of GPS)* 	 *Huw Griffiths- Marine Biologist* 	*physicist*  *Copernicus- mathematician, astronomer*  *Professor Karen Aplin Atmospheric and space scientist*  *Mae Jameson Astronaut and Engineer*

					 *Vanessa Emeka Okafor* *Astrophysicist*  *Stephen Hawking* *Physicist* 

	Year	5	Topic	Living things and their habitats
	• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. • Describe the life process of reproduction in some plants and animals.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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.	• 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

Key Vocabulary	
Deduce, process re-form, transform, adolescence, contrast	Embryo, sexual, metamorphosis, incubate, biochemical, fertilisation

Key Questions

- Life cycle differences – what's the difference between a mammal and an amphibian?
- Life cycle differences – what's the difference between an insect and a bird?
- What is similar and what is different between the life cycles of a mammal, an insect, an amphibian and a bird?
- Summer birds – who was Maria Merion and what did she do?
- The science of life - how do living things reproduce?
- Plants and animals: what's the life process of reproduction?

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.
- all living things reproduce in the same way
- only insects go through metamorphosis
- metamorphosis is the same in insects and amphibians
- plants only reproduce through pollination of the flower

	Year	5	Topic	Animals, including humans
	• Describe the changes as humans develop to old age.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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. The new statutory requirements for relationships and health education can be found below: • statutory guidance on Physical health and mental wellbeing (primary and secondary). Other useful guidance includes: • Joint briefing on teaching about puberty in KS2 from PHSE Association and Association for Science Education • Briefing on humans development and reproduction in the Primary Curriculum from PHSE Association and Association for Science Education.	• 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
Key Vocabulary	
Development, diverse, unique, generation, mature, equipped	adolescence, puberty, gestation, embryo, fœtus, womb
Key Questions	
• What is the human timeline? • How do we change into adults? • How does human and animal lifespan compare?	
Common misconceptions	
Some children may think: • a baby grows in a mother's tummy • a baby is "made". • an embryo and foetus are the same • puberty only happens to teenagers. • puberty is when you get spotty • all animals have the same gestation period.	

	Year	5	Topic	Properties and changes of 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. • Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • 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.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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.	• 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
Key Vocabulary	
Property, particle, separate, combine, recover, comparative	Atom, molecule, chemical, physical, reversible, reaction
Key Questions	
• What properties do materials have? How do we use them? • What is a solution and what is a mixture? • How can we separate materials from a mixture? • How can we separate materials from a solution? • What changes are reversible? • What changes are irreversible?	
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
- when salt is dissolved in water, it doesn't exist anymore.
- particles in a liquid are further apart than particles in a solid

	Year	5	Topic	Earth and space
	• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. • Describe the movement of the Moon relative to the Earth. • Describe the Sun, Earth and Moon as approximately spherical bodies. • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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 (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.	• 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
Key Vocabulary	
Luminous, phenomenon, attraction, approximately, relative, apparent	Orbit, axis, crescent, gravitational, waxing, waning
Key Questions	
• What are the planets in our solar system? • How does our view of the Moon change in a lunar month? • Why does the rotation of Earth result in night and day? • Why is the Earth's tilt (axis) responsible for the seasons?	
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 • the Moon changes shape • night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.	

	Year	5	Topic	Forces
	• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Identify the effects of air resistance, water resistance and friction that act between moving surfaces. • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.			

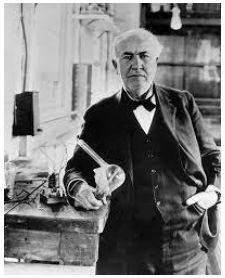
WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything 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.	• 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
Key Vocabulary	
Opposite, reaction, advantage, displace, weight, mass	Pulley, gear, pivot, fulcrum, lever, upthrust
Key Questions	
• When is friction helpful and when is it not? • What's the effect of air resistance? • What's the effect of water resistance? • Who was Galileo Galilei? • How do levers help us? • How do pulleys and gears help us?	
Common misconceptions	

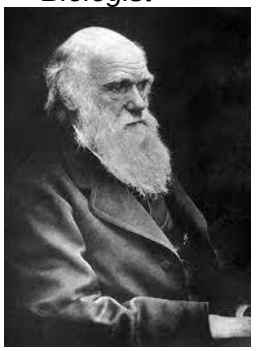
Some children may think:

- forces only act on moving objects
- when an object floats in water it becomes lighter
- 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
- when an object moves, there is only a stronger force in the forward direction
- 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.

Year 6

Overview of Topics

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
NC Programme of Study	• Electricity	• Light	• Animals Including Humans		• Evolution and Inheritance	• Living Things and their Habitats •
Number of Lessons	• Essential – 2 • Enrichment -1	• Essential – 4 • Enrichment - 2	• Essential – 2 • Enrichment -1		• Essential – 5 • Enrichment -1	• Essential – 5 • Enrichment -1
Working Scientifically Lessons	• Identifying and explaining anomalies in data • Using test results to raise questions and make predictions	•	• Recording data and results using different graphs • Science Fair Project		•	•
Curriculum Enrichment			• Science Fair		• London Zoo	• The Garden Classroom – Tree ID
Inspirational Scientists	*Thomas Edison inventor* 	*Professor Colin Webb Professor of Laser Physics* 	*Ntombizodwa Makuyana Immunologist* 		*Telma G. Laurentino Evolutionary Biologist* 	*Carl Linnaeus Botanist, zoologist, taxonomist, and physician*

		Delphine Lebrun *Material Scientist*  *Mariastefania De Vido* *Laser Scientist* 	*Michelle Williams Radiologist*  **Women in Science Day** *Rosalind Franklin* *Scientist (Discovering DNA)* 	*Charles Darwin* *Biologist* 	

	Year	6	Topic	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 micro-organisms, plants and animals. • Give reasons for classifying plants and animals based on specific characteristics.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
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.	• 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

Key Vocabulary

Characteristic, interdependence, specific, categorise, primitive, hierarchy	Fungus, arthropod, taxonomy, kingdom, phylum, genus

Key Questions

- Who was the scientist Carl Linnaeus and what did he do?
- How do we classify vertebrates?
- How do we classify invertebrates we know?
- How do we classify invertebrates we don't know?
- What are microorganisms?
- How do I classify plants?

Common misconceptions

Some children may think:

- all micro-organisms are harmful
- mushrooms are plants.
- seaweed is a plant.
- there is only an animal and plant kingdom
- slugs and snails are the only molluscs

- all bacteria are harmful
- fungi only grow in woodlands.

	Year	6	Topic	Animals, including humans
	• Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. • Describe the ways in which nutrients and water are transported within animals, including humans.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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 our 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. This content is also included in PSHE. The new statutory requirements for relationships and health education can be found below: • statutory guidance on Physical health and mental wellbeing (primary and secondary).	• 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

Key Vocabulary	
Filter, expel, substance, function, regulate, transform	Kidney, bladder, urine, excretion, toxin, nutrient

Key Questions
Remember circulation and digestion: how are these two systems connected? Where are the kidneys and what do they do? How do kidneys keep us healthy?

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
- Dehydration is not that serious.
- Water filters the toxins from your body
- 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.

	Year	6	Topic	Evolution and inheritance
	• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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.	• 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
Key Vocabulary	
Characteristic, adaption, acquire, theory, modify, generation	Evolve, survival, species, clone, inherit, fossil
Key Questions	
How have living things changed over time? How do we know? How has life evolved over time? What is DNA and what does it do? Are all offspring identical to their parents? Darwin and Wallace – what evidence did they share to argue the case for evolution? Survival of the fittest - how have animals adapted and evolved to suit their environment?	
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
- giraffes evolved long necks because the trees were tall.
- 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
- Darwin was the only scientist to discover and study evolution
- variation is the same as diversity

	Year	6	Topic	Light
	• Recognise that light appears to travel in straight lines. • 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. • 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. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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.	• 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
Key Vocabulary	
Impurity, emit. absorb, constituent, filter, artificial	Réfraction, incidence, spectrum, prism, lux, pigment
Key Questions	
• How does light travel? • What colour is light made of? • Reflection - how does light help us to see objects? • Which surfaces make the best reflectors? • Why do we see objects as a particular colour? • What happens to the appearance of objects when placed in water?	
Common misconceptions	
Some children may think: • we see objects because light travels from our eyes to the object. • a shadow is a reflection • light bounces off a mirror so can't travel in straight lines • light is only found in bright areas • we see things because light travels from our eyes towards an object.	

	Year	6	Topic	Electricity
	• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • 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. • Use recognised symbols when representing a simple circuit in a diagram.			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
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.	• 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
Key Vocabulary	
Component, consequence, systematic, represent, source, generate	Proton, neutron, electron, terminal, series, potential difference
Key Questions	
• What is electricity? How does it work? Do it - How do we build and represent a series circuit? • What are the components in a series circuit? Test it - How does the number of cells and voltage affect components in a circuit? • Diagnose it – what are the effects and consequences of changing circuit components and batteries?	
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. • electricity just flows out of a battery (cell) • electricity just comes out the end of a battery (cell) • electricity flows from both ends of the battery (cell) • electricity just comes out of a plug or socket	

- electrons are used up by devices.