

Science Overview 2023 – 2024

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Early Years Cycle A	<p>Nursery Explore how things work. Talk about the differences in materials and changes they notice.</p> <p>Prior learning • Repeat actions that have an effect. (Birth to three) Describe what they see, hear and feel whilst outside. (Reception) Recognise that they need light in order to see things and that dark is the absence of light. (Y3 – Light) Notice that light is reflected from surfaces. (Y3 – Light) Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 – Light) Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 – Light) Find patterns in the way that the size of shadows change. (Y3 – Light)</p> <p>What adults might provide ; Opportunities to explore light sources Switching light sources on and off Comparing the brightness of light sources Using different light sources in dark dens with reflective and fluorescent stickers What adults might do; Model asking questions about light sources. Encourage children to compare the brightness of different light sources. Encourage children to talk about what they see in the dark den and how it changes when a light source is on or off. Encourage children to talk about what they see when they shine light onto or through different objects or materials. Encourage children to talk about how their reflection changes in different mirrors. Support children to notice that they see their reflection on shiny objects and encourage them to predict which objects they will see their reflection in. Encourage children to draw what they see in different mirrors. Encourage children to ask questions about light sources.</p>	<p>Reception Understanding the World • Describe what they see, hear and feel whilst outside. Light Other links; Personal, Social and Emotional Development • Manage their own needs.</p> <p>Prior Learning Explore how things work. (Nursery) Talk about the differences in materials and changes they notice. (Nursery) Future learning; Recognise that they need light in order to see things and that dark is the absence of light. (Y3 – Light) Notice that light is reflected from surfaces. (Y3 – Light) Recognise that light from the Sun can be dangerous and that there are ways to protect their eyes. (Y3 – Light) Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 – Light) Find patterns in the way that the size of shadows change. (Y3 – Light)</p> <p>What adults might provide Opportunities to explore shadows Looking for shadows created by the Sun on cloudy and non-cloudy days Drawing around shadows and comparing their shape and size Making shadows using their bodies, both outside using the Sun and inside using torches Making shadows using transparent and opaque objects/materials Putting hands in a beam of light and making shadow shapes Making shadows using shadow puppets or other objects Observing a toy outside and noticing how the shadow changes during the day Observing what areas are sunny and shady at different times in the day Sharing books about shadows</p> <p>What adults might do Encourage children to talk about the shadows that they see inside and outdoors. Support children to identify the light source and the object that is making the shadow. Support children to identify that see-through objects make pale shadows and non-see-through objects make dark shadows. Support children to measure shadows using their feet or other non- standard units. Encourage children to draw around shadows throughout the day to record how they change over time. Encourage children to talk about changes they feel when the clouds cover and uncover the Sun. Encourage children to talk about the changes to the shadows when the clouds cover and uncover the Sun. Support children to choose appropriate clothing when they are hot or out in the Sun. Encourage children to ask questions about the shadows</p>	<p>Materials Nursery</p> <p>Understanding the World Use all their senses in hands-on exploration of natural materials. Explore collections of materials with similar and/or different properties. Talk about the differences between materials and changes they notice Links with other areas of learning</p> <p>Expressive Arts and Design Explore different materials freely, in order to develop their ideas about how to use them and what to make. Develop their own ideas and then decide which materials to use to express them. Join different materials and explore different textures. Prior Learning Explore natural materials, indoors and outside. (Birth to three) Explore materials with different properties. (Birth to three)</p> <p>Future Learning Describe what they see, hear and feel whilst outside. (Reception) Distinguish between an object and the material from which it is made. (Y1 – Everyday materials) Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 – Everyday materials) Describe the simple physical properties of a variety of everyday materials. (Y1 – Everyday materials) Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 – Everyday materials) Explore the natural world around them. (Reception) What adults might provide; Opportunities to explore a range of materials in a sensory way especially through touch, including more unusual materials • Exploring oobleck (cornflour and water), gellibaff, shaving foam, foam burst shower gel etc. Opportunities to shape and join materials Building junk models using a range of materials Shaping and joining materials using equipment e.g. scissors, hole punch, including when using wood e.g. a hammer and nail Opportunities to change materials Making smoothies Mixing ingredients to make playdough, cakes, biscuits, bread, jelly etc. Melting chocolate for decorating bakes/biscuits or to combine with other ingredients e.g. refrigerator cake, chocolate crispy cakes Comparing cooked and uncooked pasta, noodles, rice or potatoes Cooking popcorn in a microwave Cooking cakes, biscuits, bread etc. Making ice lollies and ice-cream</p>	<p>Materials Understanding the World Explore the natural world around them. Describe what they see, hear and feel whilst outside. Prior Learning</p> <p>Use all their senses in hands-on exploration of natural materials. (Nursery) Explore collections of materials with similar and/or different properties. (Nursery) • Talk about the differences between materials and changes they notice. (Nursery) Future Learning Distinguish between an object and the material from which it is made. (Y1 – Everyday materials) Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 – Everyday materials) Describe the simple physical properties of a variety of everyday materials. (Y1 – Everyday materials) Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 – Everyday materials) What Adults might provide: Opportunities to explore a range of materials in a sensory way, including natural materials Looking for dew, ice, icicles and frost in the playground Using their senses to explore natural materials in the environment, such as stones, twigs, leaves, feathers, seeds, flowers etc. Gathering natural materials to make collections Opportunities to make objects from different materials, including natural materials Making pictures using natural materials they have gathered from the environment Making dens, nests, bug hotels etc. using natural materials Making ice pictures by putting water in a shallow tray and adding natural objects gathered from the environment and then leaving them outside to freeze or putting them in the freezer • Making junk models with a range of materials, including natural materials they have gathered from the environment Opportunities to compare how materials change Making popcorn in a microwave and on a fire</p>	<p>Forces Nursery Understanding the World • Explore how things work. • Explore and talk about different forces they can feel. • Talk about the differences between materials and changes they notice. Prior Learning • Repeat actions that have an effect. (Birth to three) Future Learning • Explore the natural world around them. (Reception) Describe what they see, hear and feel whilst outside. (Reception)</p> <p>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 – Uses of everyday materials) Compare how things move on different surfaces. (Y3 – Forces and magnets) Observe how magnets attract or repel each other and attract some materials and not others. (Y3 – Forces and magnets) Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 – Forces and magnets) Describe magnets as having two poles. (Y3 – Forces and magnets) Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 – Forces and magnets) Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 – Forces) What adults might Provide; Opportunities to feel forces Pushing floating objects under water e.g. balloons, table tennis balls etc. Exploring magnets of different shapes and sizes Exploring springs of different sizes, both compression and extension springs Using bikes and scooters on different surfaces and ramps Opportunities to explore how things work Testing a range of objects to find out if they float or sink Playing games that contain springs e.g. bagatelle Playing with wind-up toys Racing wind-up toys Playing with gears and pulleys e.g. sets of gears, large playground pulleys etc. Playing with magnetic toys e.g. train carriages joined by magnets, magnetic construction kits etc. Opportunities to explore how objects/materials are affected by forces Pushing, pulling, twisting and bending malleable (e.g. modelling clay, playdough, springs, pipe cleaners, elastics, sponges etc.) and non-malleable objects/materials Cutting and joining objects/materials e.g. wood, building kits with nuts and bolts etc. What adults might do</p>	<p>Forces Reception Understanding the World Explore the natural world around them. Describe what they see, hear and feel whilst outside. Prior Learning Explore and talk about different forces they can feel. (Nursery) Talk about the differences between materials and changes they notice. (Nursery) Explore how things work. (Nursery) Future Learning Compare how things move on different surfaces. (Y3 – Forces and magnets) Observe how magnets attract or repel each other and attract some materials and not others. (Y3 – Forces and magnets) Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 – Forces and magnets) Describe magnets as having two poles. (Y3 – Forces and magnets) Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 – Forces and magnets) Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 – Forces) Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 – Forces) What adults might provide Opportunities to explore how to change how things work Adapting objects to see if they can be made to float or sink e.g. cutting and peeling fruit and vegetables, reshaping plasticene etc. Testing how many small objects different foil containers can hold before sinking Testing how toy cars move down ramps and gutters Testing how wheels turn when sand or water is poured through them Testing how objects fall with and without a parachute attached Testing how different balls bounce Making and testing paper aeroplanes Designing different marble runs or routes for water/sand to travel down gutters or pipes Opportunities to explore how objects move in air Identifying objects being blown around outdoors Observing how different objects fall e.g. scarves, feathers Observing how toys/objects move in the wind e.g. streamers, balloons, pinwheels, bubbles etc. Comparing the movements of a ball and a balloon when bouncing or throwing and catching Opportunities to explore how objects move in water Exploring how a marble moves through different liquids in sealed bottles Observing how sailing boats move through water What adults might do; Encourage children to talk about how they changed objects to make them float or sink. Encourage children to count and record how small objects different 'boats' can hold before they sink. Encourage children to talk about how they changed how the cars rolled down ramps/gutters. Encourage children to talk about what happened when they poured sand/water through wheels and down gutters and how they changed this Encourage children to compare how objects fall, including with or without parachutes.</p>

		<p>and rainbows that they see.</p>	<p>Using medical ice packs including self-activated cool pads Removing toys from ice Adding baking soda and fizzy bath bombs to water Adding coloured sweets to water Adding currants to fizzy water/lemonade Adding bicarbonate of soda to vinegar to make a bubbling potion</p> <p>What adults might do to support this: Encourage children to talk about the materials they explore, using their senses. Encourage children to choose from a range of materials when making models. Encourage children to join materials together to make something. Support children to name the material they have used. Encourage children to talk about why they have chosen a particular material, naming at least one property. Support children to measure out ingredients following a recipe. Encourage children to talk about ingredients. Encourage children to talk about the changes when ingredients are mixed, cooked, heated and cooled, frozen and blended. Encourage children to ask question about the materials they encounter.</p>	<p>Making pizza dough with different flours Baking bread in different tins or for different times to compare the outcome Baking cupcakes and removing one after every five minutes Choosing where to put ice cubes in the playground and observing how quickly they melt Observing how a large block of ice changes over time, using string to measure around it Putting wax crayons in different areas of the playground and observing how they change Making a snowman and observing how it changes over time Making snowballs and putting them in different parts of the playground and observing how they change over time</p> <p>What adults might do: • Making junk models with a range of materials, including natural materials they have gathered from the environment Opportunities to compare how materials change Making popcorn in a microwave and on a fire Making pizza dough with different flours Baking bread in different tins or for different times to compare the outcome</p> <p>Baking cupcakes and removing one after every five minutes Encourage children to take photographs or draw pictures to record how materials change. Encourage children to measure how objects change when they melt. Encourage children to ask questions about materials and how they change. Choosing where to put ice cubes in the playground and observing how quickly they melt Observing how a large block of ice changes over time, using string to measure around it Putting wax crayons in different areas of the playground and observing how they change Making a snowman and observing how it changes over time Making snowballs and putting them in different parts of the playground and observing how they change over time</p>	<p>Encourage children to push floating objects under water and talk about how it feels the further they push the object under the water. Encourage children to talk about what happens when they release an object under the water. • Encourage children to play with the magnets talking about how they push away or pull towards each other. Encourage children to use bikes and scooters on different surfaces. Encourage children to ride scooters and bikes up and down ramps. Encourage children to drop objects into water and observe what happens. predict whether objects will float or sink. Encourage children to talk about how they change the shape of objects. Encourage children to talk about how they join materials together using Encourage children to different forces. Encourage children to ools and building kits. Encourage children to talk about what they feel when using the woodwork work. Encourage children to talk about how toys containing springs and elastics work. Encourage children to talk about how wind-up toys, pulleys and gear toys ask questions about forces, such as "What happens if I ...?"</p>	<p>Encourage children to explore and talk about how they changed how different balls bounced. Encourage children to make different aeroplanes and compare how far they fly by marking where they land. Encourage children to describe how sand or water moves down pipes or gutters, or marbles travel down a marle run, and how they changed this. Encourage children to notice and talk about the objects in the playground that are moved by the wind. Encourage children to explore and talk about what they observe when turning bottles filled with different liquids and a marble upside down. Encourage children to ask questions about forces, such as "What happens if I ...?" Comparative testing</p>
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**Early Years Cycle A
WORKING SCIENTIFICALLY**

Enquiry Types Focus	Encouraging scientific enquiry	Encouraging scientific enquiry	Encouraging scientific enquiry	Encouraging scientific enquiry	Encouraging scientific enquiry	Encouraging scientific enquiry
	Comparative testing	Comparative testing	Classification	Comparative Testing	Comparative Testing	Comparative Testing
	Compare how bright different light sources are. Compare how reflective different materials are.	Compare the shape of shadows made by different objects.	Sort materials using simple properties. Observing over time How does the cake mixture change? How does chocolate change when heated? How does fruit juice change when put in the freezer? How does fruit change when blended?	How does popcorn made in a microwave compare to popcorn made on a fire? How quickly do ice cubes melt in different areas of the playground? How are pizza bases different when made with different flours? How does a loaf cook differently in different tins? How do cupcakes cook if they have different amounts of mixture? Observing over time How does the block of ice change over time? How does a snowman change over time? How does cake mixture/bread dough change as it is cooked?	Compare the path of different wind-up toys. Compare how far different wind-up toys move. Compare the speed and direction of gears. Compare how easy or hard it is to lift an object with or without a pulley. Compare how easy it is to ride a scooter or bike on different surfaces.	How many cubes/small plastic animals can fit in different 'boats'? Compare how cars move down ramps/gutters. Compare how wheels turn when sand or water is poured through. Compare how objects fall. Compare how objects fall with and without parachutes. Compare how different balls bounce. Compare how things move when blown. Compare how a marble moves through different liquids. Compare how different paper aeroplanes fly.
	Classification Which materials are reflective to use for an outside mobile? Which fabrics are reflective to help us be seen at night? Which materials block light to help us protect ourselves from the Sun?	Classification Which objects/materials make dark shadows? Observing over time How do the Sun and shade change during the day? How does a toy's shadow change during the day?	DO: Record Data REVIEW: Evaluate	PLAN: Setting up an Enquiry PLAN: Observe + Measure	Classification Sort objects according to whether they float or sink. Sort objects/materials according to whether their shape can be changed.	PLAN/REVIEW: Asking questions DO: Interpret and Report
	PLAN/REVIEW: Asking questions PLAN: Setting up an Enquiry	Researching using secondary sources Find out about shadows. Find out about rainbows. PLAN/REVIEW: Asking questions PLAN: Observe + Measure			PLAN/REVIEW: Asking questions DO: Interpret and Report	PLAN/REVIEW: Asking questions DO: Interpret and Report

K	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
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	<p>Materials Statutory requirements:</p> <p>Pupils should be taught to: -Distinguish between an object and the material from which it is made.</p> <p>-Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</p> <p>-Describe the simple physical properties of a variety of everyday materials.</p> <p>-Compare and group together a variety of everyday materials on the basis of their simple physical properties</p> <p>Notes and guidance (non-statutory): Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil.</p> <p>Pupils might work scientifically by: performing simple tests to explore questions, for example: 'What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?'</p>	<p>Plants Statutory requirements</p> <p>Pupils should be taught to: -observe and describe how seeds and bulbs grow into mature plants</p> <p>-find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p> <p>Notes and guidance (non-statutory) Pupils should use the local environment throughout the year to observe how different plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as to the processes of reproduction and growth in plants.</p> <p>Note: Seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.</p> <p>Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.</p>	<p>Seasonal changes Statutory requirements</p> <p>Pupils should be taught to: -observe changes across the four seasons -observe and describe weather associated with the seasons and how day length varies.</p> <p>Notes and guidance (non-statutory) Pupils should observe and talk about changes in the weather and the seasons.</p> <p>Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.</p> <p>Pupils might work scientifically by: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change.</p>	<p>Plants Statutory requirements</p> <p>Pupils should be taught to: -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.</p> <p>Notes and guidance (non-statutory) Pupils should use the local environment throughout the year to observe how different plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as to the processes of reproduction and growth in plants.</p> <p>Note: Seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.</p> <p>Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.</p>	<p>Animals including humans Statutory requirements</p> <p>Pupils should be taught to: -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.</p> <p>Notes and guidance (non-statutory) Pupils should use the local environment throughout the year to explore and answer questions about animals in their habitat. They should understand how to take care of animals taken from their local environment and the need to return them safely after study. Pupils should become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets. Pupils should have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes.</p> <p>Pupils might work scientifically by: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.</p>	<p>Living things and their habitats (covered over the whole year) Statutory requirements</p> <p>Pupils should be taught to: -explore and compare the differences between things that are living, dead, and things that have never been alive</p> <p>-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</p> <p>-identify and name a variety of plants and animals in their habitats, including micro-habitats</p> <p>-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.</p> <p>Notes and guidance (non-statutory) Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things. Pupils should be introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter). They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest.</p> <p>Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions for example: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions. They could construct a simple food chain that includes humans (e.g. grass, cow, human). They could describe the conditions in different habitats and micro-habitats (under log, on stony path, under bushes) and find out how the conditions affect the number and type(s) of plants and animals that live there.</p>
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<p align="center">KS1 Cycle A WORKING SCIENTIFICALLY Notes and guidance (non-statutory)</p>						
<p align="center">During years 1 and 2, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p>						
	<ul style="list-style-type: none"> performing simple tests 	<ul style="list-style-type: none"> observing closely, using simple equipment using their observations and ideas to suggest answers to questions gathering and recording data to help in answering questions. 	<ul style="list-style-type: none"> observing closely, using simple equipment performing simple tests gathering and recording data to help in answering questions. 	<ul style="list-style-type: none"> observing closely, using simple equipment using their observations and ideas to suggest answers to questions 	<ul style="list-style-type: none"> asking simple questions and recognising that they can be answered in different ways identifying and classifying 	<ul style="list-style-type: none"> asking simple questions and recognising that they can be answered in different ways identifying and classifying gathering and recording data to help in answering questions.
<p>Enquiry Types</p>	<p>PLAN: Setting up an Enquiry DO: Interpret and Report</p>	<p>PLAN: Observe + Measure "I observe closely" DO: Record Data 'I gather and record simple data in different ways'</p>	<p>Observe + Measure Record Data</p>	<p>Observe Interpret and Report Evaluate</p>	<p>Asking questions Interpret and Report</p>	<p>Asking questions Record Data</p>

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Living things and their habitats Statutory requirements:</p> <p>Pupils should be taught to: - 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.</p> <p>Notes and guidance (non-statutory):</p> <p>Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year.</p> <p>Pupils should explore possible ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants. Pupils could begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.</p> <p><i>Note: Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses.</i></p> <p>Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.</p> <p>Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.</p>	<p>States of matter Statutory requirements</p> <p>Pupils should be taught to: - compare and group materials together, according to whether they are solids, liquids or gases</p> <p>Notes and guidance (non-statutory)</p> <p>Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container).</p> <p><i>Note: Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.</i></p> <p>Pupils might work scientifically by:</p> <p>Grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.</p> <p>Sound Statutory requirements</p> <p>Pupils should be taught to: - 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.</p> <p>Notes and guidance (non-statutory)</p> <p>Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways.</p> <p>Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.</p>	<p>Statutory requirements Pupils should be taught to: - 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.</p> <p>Notes and guidance (non-statutory) Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year. Pupils could begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.</p> <p><i>Note: Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses.</i></p> <p>Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.</p> <p>Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.</p>	<p>Forces and Magnets Statutory requirements Pupils should be taught to: - compare how things move on different surfaces</p> <p>-notice that some forces need contact between two objects, but magnetic forces can act at a distance</p> <p>-observe how magnets attract or repel each other and attract some materials and not others</p> <p>-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</p> <p>-describe magnets as having two poles</p> <p>-predict whether two magnets will attract or repel each other, depending on which poles are facing.</p> <p>Notes and guidance (non-statutory) Pupils should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe).</p> <p>Pupils might work scientifically by: comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces and gathering and recording data to find answers their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets.</p>	<p>Light Statutory requirements Pupils should be taught to: - recognise that they need light in order to see things and that dark is the absence of light</p> <p>-notice that light is reflected from surfaces</p> <p>-recognise that light from the sun can be dangerous and that there are ways to protect their eyes</p> <p>-recognise that shadows are formed when the light from a light source is blocked by an opaque object</p> <p>-find patterns in the way that the size of shadows change.</p> <p>Notes and guidance (non-statutory) Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves. They should think about why it is important to protect their eyes from bright lights.</p> <p>They should look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change.</p> <p><i>Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.</i></p> <p>Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.</p>	<p>Statutory requirements Pupils should be taught to: - 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.</p> <p>Notes and guidance (non-statutory) Pupils should continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.</p> <p>Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. T</p> <p>They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy and design meals based on what they find out.</p>

LKS2 Cycle A
WORKING SCIENTIFICALLY

Notes and guidance (non-statutory)

Pupils in years 3 and 4 should be given a range of scientific experiences to enable them to raise their own questions about the world around them. They should start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair test is necessary and help to decide how to set it up; talk about criteria for grouping, sorting and classifying; and use simple keys. They should begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. They should help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.

They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences.

These opportunities for working scientifically should be provided across years 3 and 4 so that the expectations in the programme of study can be met by the end of year 4. Pupils are not expected to cover each aspect for every area of study.

	<p>During this unit, Year 3 and 4, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions - identifying differences, similarities or changes related to simple scientific ideas and processes 	<p>During this unit, Year 3 and 4, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - asking relevant questions and using different types of scientific enquiries to answer them - setting up simple practical enquiries, comparative and fair tests - using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions 	<p>During this unit, Year 3 and 4, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - asking relevant questions and using different types of scientific enquiries to answer them - making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers - using straightforward scientific evidence to answer questions or to support their findings. 	<p>During this unit, Year 3 and 4, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - setting up simple practical enquiries, comparative and fair tests - gathering, recording, classifying and presenting data in a variety of ways to help in answering questions - identifying differences, similarities or changes related to simple scientific ideas and processes 	<p>During this unit, Year 3 and 4, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables - reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions - using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions 	<p>During this unit, Year 3 and 4, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - gathering, recording, classifying and presenting data in a variety of ways to help in answering questions - using straightforward scientific evidence to answer questions or to support their findings
Enquiry Types Focus	<ul style="list-style-type: none"> - research - identifying, grouping and classifying 	<ul style="list-style-type: none"> - comparative / fair testing - research - identifying, grouping and classifying 	<ul style="list-style-type: none"> - comparative / fair testing - research 	<ul style="list-style-type: none"> - observation over time - how much daylight every day? Sun strength how does this link to the plants around us over the year? (could set up a light meter to read over the year) - pattern seeking 	<ul style="list-style-type: none"> - research - problem solving 	

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Properties and changes of materials Statutory requirements:</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> - 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. <p>Notes and guidance (non-statutory):</p> <p>Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes.</p> <p>Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.</p>	<p>Electricity Statutory requirements</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> -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. <p>Notes and guidance (non-statutory)</p> <p>Building on their work in year 4, pupils should construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols.</p> <p><i>Note: Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity.</i></p> <p>Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.</p>	<p>Light Statutory requirements</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> -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. <p>Notes and guidance (non-statutory)</p> <p>Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.</p> <p>Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets.</p> <p>They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).</p>	<p>Forces Statutory requirements</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> -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. <p>Notes and guidance (non-statutory)</p> <p>Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down.</p> <p>Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.</p> <p>Pupils might work scientifically by: exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.</p>	<p>Earth in Space Statutory requirements</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> -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. <p>Notes and guidance (non-statutory)</p> <p>Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night. Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).</p> <p><i>Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.</i></p> <p>Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.</p> <p>Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.</p>	<p>Animals including Humans Statutory requirements</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> -describe the changes as humans develop to old age. <p>Notes and guidance (non-statutory)</p> <p>Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty.</p> <p>Pupils could work scientifically by: researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.</p>

UKS2 Cycle A
WORKING SCIENTIFICALLY

Notes and guidance (non-statutory)

Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time.

These opportunities for working scientifically should be provided across years 5 and 6 so that the expectations in the programme of study can be met by the end of year 6. Pupils are not expected to cover each aspect for every area of study.

	<p>During this unit, Year 5 and 6, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate - recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs - identifying scientific evidence that has been used to support or refute ideas or arguments. 	<p>During this unit, Year 5 and 6, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary - recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs 	<p>During this unit, Year 5 and 6, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations - identifying scientific evidence that has been used to support or refute ideas or arguments. 	<p>During this unit, Year 5 and 6, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary - using test results to make predictions to set up further comparative and fair tests 	<p>During this unit, Year 5 and 6, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary - identifying scientific evidence that has been used to support or refute ideas or arguments. 	<p>During this unit, Year 5 and 6, the teaching focus should be to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> - recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs - reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
Enquiry Types	<p>observation over time</p> <p>problem solving</p>	<p>comparative / fair testing</p> <p>identifying, grouping and classifying</p>	<p>research</p> <p>problem solving</p>	<p>comparative / fair testing</p> <p>pattern seeking</p>	<p>research</p> <p>observation over time</p>	<p>research</p> <p>identifying, grouping and classifying</p>