SCIENCE : CURRICULUM CONTENT AND PROGRESSION FRAMEWORK

Aims and Rationale

We want our children to be able to:

- **Problem-solve and answer questions** - rich opportunities are provided where children explore their own ideas, develop and deepen
- conceptual understanding.
- **Work with independence** - thinking and reasoning is nurtured alongside a host of qualities, including resilience, determination and confidence.
- **'Be a scientist'** - a necessary toolkit of practical skills is developed and added to over time.
- **Communicate effectively** - technical and scientific vocabulary is learned, practised and used, as children communicate evidence in a variety of ways, often with different audiences in mind.

We have chosen to teach the science curriculum following the content of the national curriculum, but developing and adapting it to benefit and inspire our children. Science may be taught discretely or as part of a cross curricular approach depending on the year group. In Foundation stage it is woven into daily activities based upon the children's interests. This flexible approach to timetabling allows for greater understanding of scientific concepts, whilst also developing necessary scientific skills. The aim is for teachers to facilitate the children learning for themselves.

We have generated a variety of approaches to support this including the use of parents in STEM careers, school trips, visitors, collaboration with local schools (including secondary schools), and working with groups such as PSTT.
We aim to enable imaginative approaches to teaching and learning in science through staff CPD, and providing access to relevant and high-quality resources. We put an emphasis on pupils' independent scientific thinking, with time within lessons spent in discussion of scientific ideas, and focused recording by the pupils so less but better writing. We also aim for more time for hands-on, practical investigations. The children build on knowledge and skills learnt in previous years, repeating concepts but completing more complex tasks and investigations.

Our children enjoy science, and demonstrate high quality thinking in the classroom. There is an emphasis on 'doing' science, with pupils undertaking a wide range of different types of science practicals, including problem solving and fair testing. We have based this approach on evidence from the EEF 2012-15 study, references from the ASE best practice documents, support from a PSTT cluster group, and the STAR Alliance network meetings.

FOUNDATION	
Topics/Themes/Texts:	**The key things we want children to know/be able to do**
• asks questions about aspects of their familiar world such as the place where they live or the natural world • talk about some of the things they have observed such as plants, animals, natural and found objects • talk about why things happen and how things work • develop an understanding of growth, decay and changes over time	**Attainment -** By the end of the year: **All** children will be able to understand how places, objects, materials and living things can be the same or different. They can talk about the features of their own immediate environment. They make observations of animals and plants. **Most** children will be able to do the above, and: Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes. **Some** children will be able to do the above, and: Children know that the environment and living things are influenced by human activity. They can describe some actions which people in their own community do that help to maintain the area they live in. They know the properties of some materials and can suggest some of the purposes they are used for. They are familiar with basic scientific concepts such as floating, sinking, experimentation.
YEAR 1	
Topics/Themes/Texts:	**The key things we want children to know/be able to do**

Working Scientifically

Sc1/1.1	asking simple questions and recognising that they can be answered in different ways
Sc1/1.2	observing closely, using simple equipment
Sc1/1.3	performing simple tests
Sc1/1.4	identifying and classifying
Sc1/1.5	using their observations and ideas to suggest answers to questions
Sc1/1.6	gathering and recording data to help in answering questions.

Plants Sc1/2.1a identify and name a variety of common wild and garden plants, including deciduous and evergreen trees Sc1/2.1b identify and describe the basic structure of a variety of common flowering plants, including trees Topics include: Dinosaurs and Go Wild.	**All children will be able to:** Working scientifically to identify and classify pupils can identify plants in the school's locality: e.g. daffodils, poppies, dandelions, sunflowers, snowdrops, beans, carrots, tomatoes, strawberries, mint. Identify trees: e.g. oak, ash, horse chestnut, sycamore, fruit tree, spruce, pine, conifer, holly, blackberry or hawthorn. **Progression** • Pupils can name a limited number of plants with prompting. • Pupils can name up to 10 common plants and /or trees with little prompting, asking simple questions and recognise that they can be answered in different ways e.g. Daffodils can be identified as tall Spring flowers like tulips or yellow Spring flowers like crocuses. • Pupils can name over 10 common plants and trees with confidence and certainty gathering and recording data to help in answering simple questions. E.g. which flowers or trees would you expect to see in Spring? **Most children will be able to do the above, and:** Working scientifically by observing closely pupils can identify a plant's: Leaves, flowers, petals, fruit, roots, seed, stem and a tree's blossom, leaves, fruit, roots, buds, trunk, branches, twigs seeds. **Progression** • Pupils can name some plant/tree parts with prompting. • Pupils can name most plant/tree plants by selecting correct labels to pictures answering simple questions. • Pupils can name all common plants and trees via verbal or written labelling of pictures and diagrams: asking • simple questions and suggesting labels for tricky examples such as mushrooms, grasses or cacti. • Using their (pupils) observations and ideas to relate parts of plants to food stuffs: e.g. roots- potatoes and • carrots; stems-rhubarb or celery; leaves- cabbage or lettuce; flowers –broccoli

Everyday materials Sc1/3.1a distinguish between an object and the material from which it is made Sc1/3.1b identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock Sc1/3.1c describe the simple physical properties of a variety of everyday materials Sc1/3.1d compare and group together a variety of everyday materials on the basis of their simple physical properties Topics include: Inventions that Changed the World and Destination Space	or cauliflower; fruits and nuts.

	All children will be able to: Working scientifically pupils can identify and classify materials in school at home or in the school's locality e.g. wood, plastic, glass, metal, water and rock. **Progression** • Pupils can identify a limited number of materials with prompting. • Pupils can identify up to 6 materials with prompting questions. • Pupils can identify over 6 materials with confidence and certainty. **All children will be able to:** Work scientifically using their observations pupils can describe materials in school at home or in the school's locality as being: hard/ soft, stretchy or stiff, shiny/ dull; rough/ smooth; bendy or stiff; waterproof/ non waterproof; absorbent/non-absorbent; opaque/see-through. **Progression** • Pupils can describe at least one physical property of a limited number of materials with prompting e.g. metals are heavy. • Pupils can describe some physical properties of a limited number of materials e.g. metals are heavy, wood floats, plastic is bendy; gathering and recording data to help in answering questions. • Pupils can identify the physical properties of a wide range of materials with confidence and certainty, gathering and recording data to help in answering questions. **All children will be able to:** Work scientifically to identify and classify, perform simple tests and gather and record data pupils can give a reason(s) why material(s) are the same or different. **Progression** • Pupils can group together similar materials e.g. various different objects all made of metals. • Pupils sort a range of materials into groups with prompting questions. • Pupils sort a range of materials accurately and consistently into groups explaining their reasoning.

	All children will be able to: Work scientifically using their observations and ideas pupils can name a number of common objects found in home or school and suggest what material each is made from. **Progression** • Identify simple objects made of one material e.g. a rule as being made of wood or plastic. • Make the distinction between the object and the material it is made from e.g. a drinking glass or a plastic beaker. Can identify combination materials with confidence and certainty e.g. a wood handle on a metal • saucepan.
Animals including humans Sc1/2.2a identify and name a variety of common animals including, fish, amphibians, reptiles, birds and mammals Sc1/2.2b identify and name a variety of common animals that are carnivores, herbivores and omnivores Sc1/2.2c describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets) Sc1/2.2d identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	**All children will be able to:** Work scientifically pupils can identify and classify, across a range of contexts and opportunities, common animals seen in school, at home, on television, on holiday or at garden centre, wood or zoo e.g. – Food fish (cod, trout, tuna) clownfish, shark; fish: goldfish, koi. – Amphibians: frog, toad, newt. – Birds: blackbird, robin, starling, sparrow, tit, pigeon, duck, penguin, ostrich, swan, chicken. – Mammals: Humans, wild animals such as primates, (ape, gibbon, gorilla, orang-utan, chimpanzee) monkey, lion, tiger, elephant, zebra, giraffe etc. Farm animals: cow, horse, sheep, goat, donkey. -Pet animals: cat, dog, hamster, mouse, guinea pig: -Woodland animals: badger, fox, deer, squirrel. **Progression** • Pupils can identify and classify a limited number of animals with prompting. • Pupils can identify and classify up to 20 animals with prompting. • Pupils can identify and classify over 20 animals with confidence and certainty. **Most children will be able to do the above, and:**

Topics include: Dinosaurs, All About Me, Go Wild and Under the Sea.	Working scientifically pupils can identify, across a range of contexts and opportunities, using their observations and ideas to suggest what animals eat: Carnivores- meat eaters- tiger, wolf, orca, owl, eagle, hawk. Herbivores-plant eaters- rabbit, zebra, sheep, horse, cow: Omnivores-plant and meat eaters- Human, bear, badger, ape. **Progression** • Pupils can describe the different types of things that animals eat and give an example of a meat-eater, a plant eater and a plant and meat eater. • Pupils can group common animals into groups by what they eat e.g. all cats are carnivores. • Pupils can accurately ascribe the terms carnivore, omnivore or herbivore to most animals.
Seasonal Changes Sc1/4.1a observe changes across the 4 seasons Sc1/4.1b observe and describe weather associated with the seasons and how day length varies. This unit is delivered throughout the year.	**All children will be able to:** Working scientifically pupils make on-going observations, perform simple tests, take measurements, gather and record data, across the year, relating to weather, environmental changes (e.g. plant or animal activity), or temperature. **Progression** • Pupils can identify general seasonal change as trends across the year. And can identify general characteristics of the seasons e.g. winter being cold or summer being hot. • Pupils can describe the changing seasons with a number of indicators e.g. We make snowmen in winter or we play cricket in summer. • Pupils can associate the changing seasons with a number of indicators to animal and plant behaviour. e.g. leaves fall off deciduous trees in autumn, hedgehogs hibernate in the winter etc. **Most children will be able to do the above, and:** Working scientifically pupils make on-going observations, perform simple tests, take

	measurements, gather and record data, across the year, relating to weather, environmental changes (e.g. plant or animal activity), or temperature. **Progression** • Pupils can name the four seasons as Spring, Summer, Autumn and Winter. And can identify general characteristics of the seasons e.g. winter being cold or summer being hot. • Pupils can relate the weather typically associated with each season across a year. e.g. winter snow and frost, spring showers, warm summer sun, autumn rain and winds. Describe winter days as short and summer days as long. • Pupils can give a numerical equivalence to the temperature of the seasons. e.g. using the rhyme “5, 10, 21- winter, spring and summer sun”. Explain how the daylight hours vary between mid-winter and mid-summer. ● Pupils describe appropriate clothing for the season.

YEAR 2	
Topics/Themes/Texts:	**The key things we want children to know/be able to do**
Working Scientifically Sc2/1.1 asking simple questions and recognising that they can be answered in different ways Sc2/1.2 observing closely, using simple equipment Sc2/1.3 performing simple tests Sc2/1.4 identifying and classifying Sc2/1.5 using their observations and ideas to suggest answers to questions Sc2/1.6 gathering and recording data to help in answering questions	
Living things and their habitats Sc2/2.1a explore and compare the differences between things that are living, dead, and things that have never been alive Sc2/2.1b 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	Asking simple questions and recognising that they can be answered in different ways pupils can explain that living things undertake all of these processes; grow, move, reproduce, sense, use nutrition (have a source of energy for food), excrete waste products, respire. • Pupils understand that dead things used to undertake all of these processes. • Pupils understand that things that have never been alive do not and have not ever undertaken all of these processes. **Progression** Sc2/2.1a

Sc2/2.1c identify and name a variety of plants and animals in their habitats, including microhabitats Sc2/2.1d 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. Topics include: Dinosaurs, Go Wild and Under the Sea.	• Pupils can identify and classify some things that are living, dead and have never been alive and can identify one of the processes used to inform their sorting with prompting questions. • Pupils can identify and classify some things that are living, dead and have never been alive and can identify two or three of the processes used to inform their sorting with prompting questions. • Pupils sort things that are living, dead and have never been alive accurately and consistently into groups explaining their reasoning by referring to more than three of the processes used to inform their sorting. Using their observations and ideas to suggest answers to questions pupils can explain that a habitat is a natural environment or home of a number of different plants and animals and can give examples of some habitats. • Pupils describe the features of different habitats and explain how those features provide for the basic needs of different animals and plants, including needs for appropriate nutrition and shelter e.g. habitats within the school grounds, woodland, seashore, oceans, rainforest. • Pupils explain how animals are suited to their habitat, e.g. a badger's claws enable it to dig a sett in the ground; a camel is adapted to be able to survive for long periods without drinking; a giraffe is adapted to enable it to reach the leaves of trees that other herbivores cannot reach; a cactus is adapted to conserve water in a dry habitat; mosses on the frozen tundra are dark in colour to enable them to maximise any solar heat. • **Progression** Sc2/2.1b • Pupils match some animals and plants to their habitats and give some reasons for their matching with prompting questions. • Pupils match a range of animals and plants to the most appropriate habitats and give reasons for their matching with prompting questions. • Pupils explain the relationship between animals and plants living in habitats, giving examples from more than two contrasting habitats.

	• Pupils can identify and classify animals and plants living within different habitats and using their observations and ideas explain the relationships between the features of the habitats and the needs of the animals and plants. (link to physical geography on the location of the Equator and the North and South Poles).
	• Pupils can explain that a micro-habitat is a very small habitat and can give examples of micro-habitats e.g. school pond, wormery, greenhouse, leaf litter.
	  ○ e.g. lions, penguins, polar bears live in a habitat with sufficient prey, appropriate climate, adequate shelter and opportunities to reproduce.
	  ○ e.g. foxes live in habitats with sufficient prey and/or scavenging opportunities, shelter, soil conditions to dig earths and opportunities to reproduce. e.g. woodlice live in a micro-habitat with appropriate and sufficient sources of food, adequate shelter, climate conditions and opportunities to reproduce. e.g. fungi grow in damp habitats, cacti grow in dry habitats.
	  ○
	
	Progression
	• Pupils sort animals and plants into two contrasting habitats.
	• Pupils identify the animals and plants which live in two contrasting habitats.
	• Pupils identify the animals and plants which live a range of contrasting habitats and explain the features of the habitats which meet the needs of those animals and plants.
	
	Working scientifically, closely observing and gathering and recording data from secondary sources pupils understand that different animals obtain their food from different sources and that the sources of food can be illustrated by using a food chain.
	  • Pupils work backwards from knowledge of what herbivores, carnivores or omnivores eat to understand that plants are at the beginning of food chains.

	• Pupils use their developing understanding of food chains for carnivores to create and explain a food chain for a school dinner e.g. shepherd's pie, fish fingers, chips and peas. **Progression** • From a number of deconstructed food chains pupils can identify that a plant is at the beginning of each. • Draw and label a diagram of a simple food chain for a carnivorous animal and for a human meal. • Draw and label diagrams of food chains using appropriate scientific vocabulary for a human meal and at least two carnivorous animals.
Sc2/2.2 Plants Sc2/2.2a observe and describe how seeds and bulbs grow into mature plants Sc2/2.2b find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. Topics include: Dinosaurs and Go Wild.	Working scientifically observing closely, using simple equipment and performing simple tests pupils plant a variety of seeds and bulbs, including flowering and vegetable seeds, gathering and recording data on how the seeds and bulbs grow into mature plants. • Pupils learn that seeds can be gathered from some mature plants, e.g. sunflower seeds, tomato seeds, beans, and be replanted to begin the plant lifecycle again. **Progression** • Pupils record their observations of how seeds and bulbs grow through drawings or photographs, matching simple labels to the correct stage of a plant's growth. • Pupils draw and label diagrams to record their observations and record simple measurements of how seeds and bulbs grow. • Pupils take and record using standard measures to show their understanding of how seeds and bulbs grow. • Pupils can explain the lifecycle of a plant they have studied, including the replanting of harvested seeds

	• Working scientifically using simple equipment and performing simple tests pupils plant seeds and bulbs and plan an investigation to enable them to observe the growth and health of the plants under conditions where the water, light and temperature vary, including gathering and recording data of plant growth. • Pupils use what they learn from their observations to plan further investigations to test their emerging understanding of the optimal conditions for plant growth. **Progression** • Pupils observe and record through drawings or photographs how different conditions of water, light and temperature affect the growth and health of plants. • Pupils give simple explanations why the plants in different conditions grow differently. • Pupils make predict, test, and record, through drawings or photographs, and explain their observations to show understanding of the optimal conditions that plants need to grow and stay healthy. • Pupils use their understanding from this investigation to make predictions about what will happen when a different type of plant is studied under varying water, light and temperature conditions and test their predictions through further investigations.
Sc2/2.3 Animals including humans Sc2/2.3a notice that animals, including humans, have offspring which grow into adults Sc2/2.3b find out about and describe the basic needs of animals, including humans, for survival (water, food and air) Sc2/2.3c describe the importance for humans	• Pupils learn about the development of humans from babies to older adults, thinking about the capabilities at different stages of development. • Pupils identify parents and offspring of animals where the offspring look similar to the parent, and move on to identify parents and offspring which look initially dissimilar. • Pupils investigate the lifecycle of some animals, using opportunities for first hand observation where available, undertaking some guided research involving secondary sources.

of exercise, eating the right amounts of different types of food, and hygiene. Topics include: Dinosaurs and Go Wild.	**Progression** • Pupils match some parents and offspring, including human babies and adults and animals where parents and offspring look similar e.g. calf – cow, lamb - sheep. • Pupils match a wider range of parents and offspring, including examples where parents and offspring look dissimilar e.g. egg – chicken, spawn –tadpole-frog. • Pupils can sort pictures of humans at key stages of development e.g. baby – toddler – child – teenager – adult – older adult, and can identify some changes in capabilities at the different stages. • Pupils demonstrate awareness of the lifecycles of a wider range of animals, including examples where parents and offspring look dissimilar, e.g. butterfly, dragonfly, frog. Working scientifically using their observations and ideas pupils think about the basic needs of humans and the signals experienced to indicate hunger and thirst. They undertake practical investigation in PE lessons to identify that humans become out of breath when they undertake vigorous exercise. • Pupils are taught that humans eat different types and amounts of food at different stages of development, e.g. babies drink milk and toddlers eat smaller quantities of food than adults. • Pupils learn that all animals have similar basic needs for water, food and air, although the types and amounts of food that they eat and amounts of water drunk vary considerably, e.g. investigate the dietary needs of an elephant, a camel, a mouse. • Pupils discuss some familiar examples, e.g. discussing how to look after different pets. **Progression** • Pupils identify that animals need water, food and air for survival. • Pupils can identify and explain the signals they experience when feeling thirsty, hungry and out of breath.

	• Pupils can give a suggestion as to the health implications of lack of food, water or air. Pupils show understanding of how to care for a pet. • Pupils know that different animals require different amounts of food and water to survive. Pupils can describe why humans eat different types and amounts of food at different stages of development. • Pupils can explain the importance for humans of undertaking exercise and the consequences of not taking sufficient exercise for health. • Pupils know that the heart is a major organ and working scientifically perform simple tests using simple equipment to discover that its pumping action can be heard or felt as a pulse. • Pupils learn about the different • food groups and find out what role of those food groups is for keeping the body healthy (including fruits and vegetables; meat, fish nuts and eggs, dairy, fats and sugars, grains, cereals and potatoes – extending to use scientific terminology of carbohydrates, proteins, vitamins and minerals). • Pupils understand the concept of a balanced diet for human health. • Pupils learn about hygiene in relation to food preparation and eating, and the importance of hand washing after using the toilet. **Progression** • Pupils know that humans need exercise to keep healthy. • Pupils can select from a range of foods some which make up a balanced meal. • Pupils know that they should wash their hands before eating. • Pupils know that their heart pumps faster when they exercise and that they can feel this as a pulse. • Pupils can identify the main food groups and can plan their own balanced meal. • Pupils explain why they should wash their hands before preparing and eating food.

	• Pupils can identify how exercise impacts positively on the body in relation to heart and circulation of blood and oxygen, and some consequences of taking insufficient exercise. • Pupils can explain the consequences for human health of not eating a balanced diet and can name all of the main food groups and their role in keeping the body healthy. • Pupils know that germs can make humans unwell and can identify how the spread of germs can be reduced.
Sc2/3.1 Uses of everyday materials Sc2/3.1a identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses Sc2/3.1b compare how things move on different surfaces. Sc2/3.1c find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. Topics include: Inventions that Changed the World and Destination Space.	Working scientifically pupils can identify and classify a number of different materials that could be used to make an object or part of it, e.g. a window frame can be made from wood, plastic or metal. • Pupils evaluate how appropriate different materials would be for particular uses by thinking about the functions of the object and properties of the material that make them suitable or unsuitable for a particular purpose, e.g. a rule or spoon can be made from plastic, wood or metal, but not glass; a waterproof coat can be made from plastic and some fabrics with appropriate properties, but not from paper or metal. • Pupils find out that many materials are used for more than one thing, e.g. metal can be used to make coins, parts of a car body and engine, food and drink cans, parts of furniture; wood can be used to make tables, shelves, pencils, picture frames. • Pupils use the vocabulary learned in year 1 to describe the properties of materials and sort materials into groups - hard/soft, stretchy/stiff, shiny/dull; rough/smooth; bendy /stiff; waterproof/ non waterproof; absorbent/non-absorbent; opaque/see-through and extend their vocabulary e.g. using terms – transparent, flexible, rigid to apply to their explanations. • Pupils learn about some specific materials e.g. using simple tests that the properties of some metals influence their use – copper is a good conductor of

	electricity so is used in electric cables; aluminium, durable, malleable, lightweight and abundant so is used for food packaging. **Progression** • Pupils identify that materials can be used to make a number of different things. • Pupils can give suggestions as to why a material would be unsuitable for an object e.g. metal is unsuitable to make a window pane. • Pupils identify three objects which can be made from a number of different materials, can give examples of other materials that are unsuitable to make those objects and are able to say why they are unsuitable in terms of their properties. • Pupils can give more than three examples showing their understanding that a range of materials can be used to make many different objects, clearly explaining the relationship between the properties of the materials and the function of the objects in scientific terms. Pupils could invent a new material which has a number of useful properties. • Pupils make predictions and working scientifically perform simple tests and use simple equipment to investigate how materials can be changed by squashing, bending, twisting and stretching, recording the results of their investigations. Pupils make further predictions about the properties of other materials based on their initial investigations of similar materials. **Progression** • Pupils can describe how the shapes of some objects can be changed by squashing and know that some objects are too hard to be squashed by hand. • Pupils can describe and record their observations of how some objects are changed by bending, twisting or stretching. Pupils know that the properties of some objects mean that they cannot be bent, twisted or stretched by hand.

	• Pupils relate their knowledge of the properties of objects to their functions, e.g. wood is a suitable material from which to make a table because it cannot ordinarily be squashed, bent, twisted or stretched; wood is rigid, hard, non-absorbent, waterproof and through the manufacturing process can be made smooth.
YEAR 3	
Topics/Themes/Texts:	**The key things we want children to know/be able to do**
Working Scientifically Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them Sc4/1.2 setting up simple practical enquiries, comparative and fair tests Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings	
Plants Sc3/2.1a identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers	Working scientifically to identifying differences or similarities pupils can name the parts of a range of well-known flowering plants and know that the function is the same despite a difference in appearance, for example a sunflower's stem compared to a daisy. **Progression** • With prompting, pupils recognise the roots, stem, leaves and flowers of a

Sc3/2.1b 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 Sc3/2.1c investigate the way in which water is transported within plants Sc3/2.1d explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	range of everyday flowering plants and know that these have a particular function. • Independently, pupils identify roots, stem, flower and leaves on plants including root vegetables within child's experience. Recall that the root takes in water and can anchor the plant, the stem aids limited • movement and supports plant; leaves are necessary as "the factories" to make sugars and the petals and flowers attract insects and identify these on given plants. • Pupils apply the functions to more unusual plants such as a cactus, deciduous trees, etc and consider adaptations of a function such as the leaf in a pitcher plant or Venus Fly-trap. Working scientifically asking relevant questions and using different types of scientific enquiry pupils can explore requirements for healthy growth making systematic and careful observations of a range of plants and their preferred growing conditions, e.g.: Consider how germination might be affected by heat ... how plants in desert climates grow with limited water and water lilies grow in ponds… etc. **Progression** • Pupils to plan an experiment that shows that limiting a plant's essential requirements may affect its growth. • Pupils should predict; simply record results and draw conclusions on the essential requirements for healthy plant growth. • Pupils will have a working knowledge of requirements and will use this to plan and investigate the requirements for healthy plant growth. Pupils recognise that plants in the local environment will all have these requirements but the rates of germination, growth, flowering, etc varies between, varieties, species and locations. • Pupils' investigations inform them of further questions/investigations needed. Pupils recognise that plants globally have essential requirements for growth but these might be specially adapted.

	Working scientifically, pupils investigate, using a variety of tasks and straightforward scientific evidence, to show water movement from its absorption at the roots, through the xylem in the stem and out through the stomata in the leaves. **Progression** • Pupils describe how water is taken in at the root and exits the plant at the leaf. • Pupils explain that the root, stem and leaves of a plant all transport water and will become wilted (flaccid) if lacking in water. • Pupils link the transportation of water through a plant to the transportation of minerals. • Pupils use evidence from: research; observations of flowers in situ; from deconstructing a range of flowers and seed pods to look for plant parts common to all; to explore the role of flowers in the pollination and fertilisation of flowering plants; looking for links between the structure of the fruits and how the seeds are dispersed: e.g. dandelion by wind, blackberries by birds in faeces, teasels in animal fur. **Progression** • Pupils can describe that flowering plants have a life-cycle with defined stages. • Pupils can explain that flowering plants have a life cycle with defined stages, some of which are the same in flowering plants such as pollination but other aspects are different such as seed formation and dispersal. • Pupils use the correct scientific vocabulary for the processes: germination, pollination, fertilisation and seed dispersal.
Animals including humans Sc3/2.2a identify that animals, including humans, need	Building on the work in year 2 about the criteria for living things and food chains, pupils demonstrate awareness that animals are unable to produce their own food internally, but need to eat in order to take in nutrients. Working scientifically, pupils undertake research, including making systematic and careful observations, gathering and presenting survey data, to identify that animals,

the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat Sc3/2.2b identify that humans and some other animal have skeletons and muscles for support, protection and movement.	including humans, need the right amount and type of nutrition to keep healthy. Building on learning about the food groups in year 2 pupils extend their knowledge using scientific terminology of carbohydrates, proteins, vitamins and minerals and the role of these food groups for keeping the human body healthy. **Progression** • Pupils recognise that animals including humans need energy that is provided by eating food. Pupils understand that eating too much food or the wrong types of food can make you gain weight and this is unhealthy. • Pupils can name the different food groups from which food should be selected in order to provide a healthy, balanced diet for humans. • Pupils can identify the main food groups and explain the role of each food group in keeping the body healthy. • Pupils apply their knowledge of the different food groups to planning a healthy menu and can explain the consequences for human health of not eating a balanced diet. Working scientifically using models, diagrams and other secondary sources pupils compare a range of animals' skeletal structures; how the bones and muscles interact and combine to allow movement and afford protection. Pupils recognise that invertebrates have an external skeleton and vertebrates have skeletons inside them. **Progression** • Identify that some animals (including humans) have skeletons from pictures/x-rays of skeletons. Identify a limited number of bones and muscles. • Recognise that all vertebrates have a skeletal and muscular system that enables movement, support and protections. Pupils can identify some key human bones e.g. skull, spine, ribcage and muscles e.g. biceps, triceps. Pupils explore the simple mechanics of contraction and relaxation of muscles in combination with bones at joints in vertebrate movement. • Increased awareness of the adaptations of invertebrates and how they might

	be protected, e.g. exoskeletons, shells, etc. and how not having a skeleton enables different movement.
Rocks Sc3/3.1a compare and group together different kinds of rocks on the basis of their appearance and simple physical properties Sc3/3.1b describe in simple terms how fossils are formed when things that have lived are trapped within rock Sc3/3.1c recognise that soils are made from rocks and organic matter.	Working scientifically, setting up simple practical enquiries, comparative and fair tests pupils can sort a range of metamorphic, igneous and sedimentary rocks using a variety of characteristics and say why they are the same and different: e.g. - smooth/rough; hard/soft; permeable/impermeable; heavy/light; inclusion of crystals, grains, fossils, etc. **Progression** • With support, pupils can sort using at least 2 attributes. • Using own observations, pupils can compare and group rocks using a range of plausible criteria, not necessarily with accurate scientific vocabulary. • Can describe using appropriate scientific vocabulary. Pupils can describe that fossils are the traces or impressions of living things from past geologic ages, or the traces of their activities, such as dinosaur footprints. **Progression** • Pupils show an increased awareness of the many millions of years a fossil takes to make and that a fossil is a mould of a creature's body or activity, not a creature turned to stone. • Pupils know fossils only form in sedimentary rocks and can describe in simple terms the chronology of the stages of fossilisation being: E.g. - initial entrapment of a creature in a sediment so they do not rot, a quick burial and then repeated layering of sediment, etc. • Using the correct scientific vocabulary pupils can sequence the formation of fossils. Working scientifically, setting up simple practical enquiries, comparative and fair tests

	pupils can recognise that soils are different depending on their constituent parts; this is in turn dependant on the local geology and varies across the country. **Progression** • With support recognise that pebbles and stones are broken rocks and organic matter is animal and plant debris and a mix of these helps make soil. • Pupils can describe that soils are a mixture of tiny particles of rock, dead plants and animals, air and water; the amount of which can vary. • Pupils explain that sandy, clay, chalky and peat based soils are different mixes of components and that different plants could thrive in them.
Light Sc3/4.1a recognise that they need light in order to see things and that dark is the absence of light Sc3/4.1b notice that light is reflected from surfaces Sc3/4.1c recognise that light from the sun can be dangerous and that there are ways to protect their eyes Sc3/4.1d recognise that shadows are formed when the light from a light source is blocked by a solid object Sc3/4.1e find patterns in the way that the size of shadow change.	Pupils recognise that we see things when light from a source enters our eyes, and without light we are unable to see. **Progression** • Can explain that light is needed to see and apply this in simple terms such as: when eyes are closed we no longer see as light cannot enter our eyes. • Pupils can recognise that light can come in many forms including the colours of the rainbow (natural and manmade) and without light we cannot see. • Recognise that blocking of light by a solid (opaque) object is what makes a shadow and link this to eclipses and other natural and everyday phenomena. Working scientifically using straightforward scientific evidence to answer questions or to support their findings pupils notice that some surfaces, including the moon, are better reflectors than others. **Progression** • Pupils can show using pictures or simple diagrams that a reflection is due to light “bouncing” off the surface of the object and if the light is lessened or the surface is not shiny then the clarity of the reflection will be diminished.

	• That light reflects off shiny, light and smooth materials better than dull, dark and rough materials that do not reflect light well. • Application of this understanding to the use of reflectivity in everyday usage; bicycle reflectors, car mirrors, ships' periscopes, high visibility vests/coats. Pupils recognise that even scientists never look directly at the sun and instead use specially adapted telescopes or observe images sent from unmanned space-probes, millions of miles away in space. **Progression** • Pupils MUST KNOW that looking directly at the sun can be dangerous and cause permanent damage even if wearing sunglasses. • Pupils recognise that eyes need protection from the sun just as skin does and that is why sunhats with a peak or sunglasses are worn. • Pupil use secondary sources to explore the consequences to eyesight and general health of prolonged exposure to sunlight.
Forces and Magnets Sc3/4.2a compare how things move on different surfaces Sc3/4.2b notice that some forces need contact between 2 objects, but magnetic forces can act at a distance Sc3/4.2c observe how magnets attract or repel each other and attract some materials and not others	Pupils recognise there are forces in action when items are moved on different surfaces (friction) and working scientifically recording findings using simple scientific language, drawings, labelled diagrams, bar charts, and tables. **Progression** • Investigates surface friction and can conclude that some surfaces slow objects down and others cause them to move more quickly than others. • Investigates surface friction and can conclude that rough surfaces slow you down and smooth surfaces don't slow you as much. • Apply understanding to grips on tyres and shoes; skiing and ice-skating, etc. Use photographic evidence of forces in action to show how manipulation of forces has enabled advantageous inventions/structures. Consider the characteristics of

Sc3/4.2d 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 Sc3/4.2e describe magnets as having 2 poles Sc3/4.2f predict whether 2 magnets will attract or repel each other, depending on which poles are facing.	magnetism and how forces act at a distance: this can be modelled simply and/or applied to relatively new technologies such as electromagnetic repulsion (the bullet train). **Progression** • Recognise that the unusual property of a force that can act from a distance can be used to make pictures move 'magically'. • Recognise that the unusual property of a force that can act from a distance can and is used for both simple and advanced technologies. • Pupils use their knowledge and understanding of magnets acting at a distance to explain the 'hanging paperclip' and then relate that to everyday situations like self-closing wardrobe doors. Using secondary sources pupils observe the image of the magnetic field made by iron filings when like and not like poles are placed close together. Pupils investigate the attraction of a variety of materials by a magnet. **Progression** • Explain in their own terms what happens when poles are brought together, e.g., the magnets 'stick' or 'push' each other away and is aware that materials made of metal will be attracted to a magnet. • Independently can describe the effect of magnetism by using the terms attraction and repulsion, and is aware that there are only a few metals that are magnetic, but may not know all names. • Can describe magnetism using correct scientific vocabulary and recognises that not just iron, but also steel, nickel and cobalt can be magnetic and will attract. Working scientifically, setting up simple practical enquiries, comparative and fair tests pupils can sort and test a variety of everyday materials on the basis of their magnetic

	attraction. **Progression** • Recognises that when an object 'sticks' to the magnet that it is a magnetic material and not all materials do this. • Can independently group and compare everyday objects by testing for magnetism and recognise that certain metal items or items made with a mix of these metals (lodestone) are magnetic whilst some are not. • Question why and determine how to test to find out which metals are magnetic. Working scientifically, setting up simple practical enquiries, comparative and fair tests pupils discover that every magnet has two opposite poles called, for convenience, North and South. **Progression** • Pupils can identify the opposite poles of a bar magnet. • Labels a range of magnets to show the two poles; recognises that these align themselves with the earth's magnetic north. • Investigate a range of different shaped magnets identifying the correct pole when referred to a norm and explain why when a bar magnet is halved it makes two new magnets. Working scientifically, setting up simple practical enquiries, comparative and fair tests pupils discover what happens when like poles of a magnet and unlike poles of a magnet are presented together. **Progression** • Recognises that the magnet needs turning around if it doesn't attract or repel as expected. • Pupils can explain that opposites attract (N and S) and like repel (S and S; N

	and N). • Pupils can accurately and consistently predict the outcome of placing the poles of known magnets together.
YEAR 4	
Topics/Themes/Texts:	**The key things we want children to know/be able to do**
Working Scientifically Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them Sc4/1.2 setting up simple practical enquiries, comparative and fair tests Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings.	
All Living Things Sc4/2.1a recognise that living things can be grouped in a variety of ways Sc4/2.1b explore and use classification keys	Working scientifically identifying differences, similarities or changes related to simple scientific ideas and processes and building upon the work on Plants and Animals, including humans undertaken in Key Stage 1; • Pupils use a variety of secondary resources and conduct surveys of their local

to help group, identify and name a variety of living things in their local and wider environment Sc4/2.1c recognise that environments can change and that this can sometimes pose dangers to living things.	environment to produce a list of living things (both plant and animal) which they then sort into groups. • Pupils identify simple ways in which plants and animals could be sorted e.g. flowering and non-flowering plants; warm- and cold-blooded animals. • Pupils use a number of different methods to sort plants or animals using more than one physical characteristic or environmental factor e.g. whether the plant is wind or animal pollinated or if the animal is a herbivore or carnivore. • Pupils begin to routinely and accurately ascribe plants and animals according to their taxonomic group. E.g. chordate animals as mammals, reptiles, amphibian, birds or fish. Working scientifically pupils closely observe and research a variety of plants and/or animals using straightforward scientific evidence of characteristics that can be used to identify them e.g. colour of flower, shape of leaf, number of legs, were the animal lives etc. and use these observed characteristics to sort them into groups. **Progression** • Pupils use one observable characteristic to sort animals and plants into groups. • Pupils use more than one observable characteristic to sort animals and/or plants using simple Venn or Carroll diagrams to construct a simple branched identification. • Pupils use interconnecting Venn diagrams or Carroll diagrams with two criteria to construct branched or number identification keys to sort animals and plants. Building upon the work done in Year 2 on habitats pupils work scientifically to observe change within a local environment or habitat and then report their findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions noting any impact upon the population or distribution of living things

	within that habitat. **Progression** • Pupils make observations and draw simple conclusions e.g. paths are made where we walk because the plants cannot live when they are trampled. • Pupils identify one factor that has changed within the environment or habitat and note the effect that this has had on the chances of survival of those organisms which rely on it. E.g. the school pond has become full of algae so that the fish have less oxygen. • Pupils can explain that a number of different factors can affect the diversity or abundance of plant or animal growth and can ascribe these factors to the positive or negative influence of human activity.
Animals including humans Sc4/2.2a describe the simple functions of the basic parts of the digestive system in humans Sc4/2.2b identify the different types of teeth in humans and their simple functions Sc4/2.2c construct and interpret a variety of food chains, identifying producers, predators and prey.	Working scientifically using secondary sources, pupils draw diagrams or construct models to describe the tissues and organs of the digestive system in humans. **Progression** • List the main parts of the digestive system e.g.: mouth, teeth, tongue, oesophagus, stomach, pancreas, small and large intestines, appendix, rectum and anus. • Accurately label a diagram of the digestive system correctly sequencing the named tissues and organs. • Describe the functions of the organs in the human digestive system in terms of: ingestion as taking in food; digestion as physically or chemically breaking food down into soluble nutrients; absorption as taking nutrients into the blood for transport and egestion as getting rid of undigested waste. Using diagrams, models, biological samples or secondary sources pupils can name

	the four types of teeth as: canine, incisor, premolar and molar. • Pupils relate the position of the teeth in the human mouth to the mechanical processes of eating describing the functions of the teeth in simple terms such as cutting or grinding. • Pupils accurately ascribe the function of the four types of human teeth explaining how the structure and shape is adapted to the job it has. Building upon the work done in Year 1 where pupils group animals by what they eat describing the animal as an herbivore, carnivore or omnivore; Pupils construct simple food chains from observation, pictures, stories or secondary research. **Progression** • Pupils start each food chain with a plant describing this plant as a producer. Food chains are of one or two steps e.g. grass- cow or lettuce – rabbit - fox. • Pupils construct food chains of a variety of lengths correctly identifying the producer, a predator and a prey animal. • Pupils consistently and accurately construct food chains within a defined habitat, correctly identifying: the producer, specific predator/prey relationships and the top predator. • Pupils add arrows to show energy flow within the food chain.
States of Matter Sc4/3.1a compare and group materials together, according to whether they are solids, liquids or gases Sc4/3.1b observe that some materials change state when they are heated or cooled, and measure	Working scientifically identifying differences, similarities or changes related to simple scientific ideas and processes pupils closely observe and can describe the properties of: – Solids- as having a fixed shape, non-flowing and incompressible. – Liquids - as having no fixed shape, flowing to fill the bottom of a container and incompressible. – Gases - as having no fixed shape, completely filling any container and compressible.

	or research the temperature at which this happens in degrees Celsius (°C)	**Progression** • From observations and/or research pupils can sort a number of common objects into S/L/G. • Pupils can consistently and accurately sort a wide range of objects into S/L/G. • Pupils can use knowledge of the physical properties of solids, liquids and gases to determine whether tricky substances such as mists, foams, gels, pastes are S/L/G.
Sc4/3.1c	identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Working scientifically and with reference to 'Be Safe' pupils undertake practical activities making systematic and careful observations and where appropriate, taking accurate measurements using standard units, using a range of equipment, for example thermometers and data loggers to investigate the physical results of heating and cooling on a range of materials found in the classroom and home. • Pupils can describe the effect of heating some substances as melting and/or boiling. • Pupils can describe the effect of heating and cooling some substances as melting, boiling, freezing and condensing and construct a simple temperature chart showing the changes of state from solid to liquid or liquid to gas. Pupils observe that the melting and freezing point of substances are the same. • From practical investigation and secondary research pupils construct a temperature scale mapping the melting and boiling points of a wide range of substances e.g. alcohol, mercury, water, cooking oil, tar, gases • including air and/or oxygen. (link to negative numbers in mathematics). Working scientifically using results from practical activities pupils investigate the physical results of heating and cooling water. Draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests.

	Progression • Pupils can make general statements from the outcomes of observations or practical activities such as; puddles evaporate in the sunshine or condensation forms on the windows when it is cold outside. • Pupils relate the water evaporating from seas and lakes to the formation of clouds; when it rains water vapour condenses into raindrops; relate the rate of evaporation to the ambient temperature of the surroundings. • Pupils research or construct models to show how water is constantly evaporating and condensing in different • local and geographical areas to set up the water cycle and weather patterns. Pupils can identify that: snow, • sleet, hail and rain are all forms of condensed water.
Sound Sc4/4.1a identify how sounds are made, associating some of them with something vibrating Sc4/4.1b recognise that vibrations from sounds travel through a medium to the ear Sc4/4.1c find patterns between the pitch of a sound and features of the object that produced it Sc4/4.1d find patterns between the volume of a sound and the strength of the vibrations that produced it. Sc4/4.1e recognise that sounds get fainter as the distance from the sound source increases	Working scientifically setting up simple practical enquiries, comparative and fair test pupils can describe a number of different ways that a sound can be made e.g. by hitting, rubbing, shaking or blowing a number of objects and/or musical instruments. **Progression** • By observing and reporting pupils say, in simple terms, what happens when an object that is making a noise e.g. a tuning fork, is placed against the skin, into water or onto a suspended ping pong ball. • Pupils conduct a sound survey and relate the rapid movement of the object or one piece of an object to an individual sound. • Pupils identify which part of a musical instrument 'makes' the noise, describing it as vibrating. Working scientifically setting up simple practical enquiries, comparative and fair test pupils describe how the sound from a vibrating object or musical instrument reaches the ears.

	Progression • Pupils place their ears on a table and state what they hear when another pupil lightly taps on the other end of the table giving reasons. • Pupils explain why they can hear music when in the bath or how whales and dolphins can communicate at sea. • Using a particle model pupils can give reasons why little or no sound is heard when a bell is placed in a vacuum jar. Building upon the Year 2 work on everyday uses of materials; pupils work scientifically asking relevant questions and using different types of scientific enquiries to answer them investigate the outcomes in terms of pitch of changing the physical dimensions or materials of the object making the sound. **Progression** • Pupils describe in simple terms what happens when the length of the sound producer is changed e.g. cutting straw oboes with scissors, blowing down different sized tubes, hitting different length nails or pipes. • Pupils change the material an object is made from. Do plastic pipes make the same sound as metal pipes? • Does a glockenspiel sound the same as a xylophone? • Pupils use their knowledge and understanding of the patterns of pitch linked to the physical properties of objects to design and/or construct their own variable pitch musical instrument. Building upon earlier work on how sounds are made; pupils undertake a range of fair test practical activities to investigate the outcomes in terms of volume of changing the physical dimensions of the action creating the sound.

	Progression • Pupils describe in simple terms that the bigger the action the louder the sound produced e.g. hitting a drum harder will produce a louder sound. • Pupils can give reasons in terms of vibrations why playing loud music might be bad for their ears. Pupils can suggest ways they could soundproof their bedrooms. • Using a particle model; pupils can give reasons why a bell that is muffled and then hit will not be as loud as a bell that is hit without a muffler. Pupils can suggest reasons why a car exhaust silencer works and what materials might be inside the silencer. Pupils work scientifically making systematic and careful observations and where appropriate, taking accurate measurements using standard units, using a range of equipment, for example data loggers or sound meters to investigate how volume is affected by distance. **Progression** • Pupils produce graphical representations of their findings and report in simple terms that volume decreases as distance from the sound source increases. • Pupils can explain in a number of different contexts how the knowledge of the relationship between volume and distance from source is useful e.g. when crossing the road at night or fog sirens giving the proximity to dangerous rocks. • Using a particle model pupils can explain how the vibrations/ displacement decreases as the sound energy dissipates.
Electricity Sc4/4.2a identify common appliances that run on electricity Sc4/4.2b construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and	Pupils can identify, across a range of contexts and opportunities, common electrical appliances seen in school, home, or local community. **Progression** • Pupils list a number of common appliances such television, washing machine, torch, radio, computer, toaster, oven, vacuum cleaner and explain how they

buzzers Sc4/4.2c 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 Sc4/4.2d recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit Sc4/4.2e recognise some common conductors and insulators, and associate metals with being good conductors.	would ensure their and others' safety when used. • Pupils can identify electrical appliances that could be used in a variety of given situations and can sub- divide these into mains power and battery driven appliances. • Pupils can construct a comprehensive list of electrical appliances found in a wide range of situations and make comparative judgements into the advantages and disadvantages of using mains or battery power. Undertaking practical activities pupils work scientifically to assemble simple series circuits that contain a varying number of cells, bulbs, switches and buzzers. **Progression** • With help pupils can safely construct simple series circuits that work and can give some simple statements about how changing components affected the circuit and with prompting can name the components they used. • With little help pupils can construct working circuits undertake simple 'fair test' investigations and make general quantative statements about the results of their changes. • Pupils work independently, problem solving as necessary, to consistently construct circuits that work carrying out simple investigations accurately recording and reporting their findings using correct scientific vocabulary. • Undertaking practical activities pupils work scientifically to assemble simple series circuits that contain switches in a variety of places. **Progression** • Pupils add one switch to a circuit and explain in terms of completing the circuit whether the lamp will light when the switch is open or closed. • Pupils can add a number of switches to a circuit and explain in terms of completing a circuit that all switches have to be closed for the lamp to light. • Pupils construct a number of different types of switch e.g. gate switch or pressure switch and suggest where these would be best positioned within a

	circuit to fulfil a specific task e.g. a pressure switch under a carpet in a burglar alarm. Using a variety of physical, virtual or diagrammatic representations of simple series circuits pupils can decide whether a lamp will light. **Progression** • Pupils can correctly predict the outcome when given a representation that can be followed with a finger and with some prompting. • Pupils can independently correctly predict the outcome when using standard representations. • Pupils accurately and consistently predict the outcome using a wide variety of representations of series circuits. Working scientifically pupils undertake practical activities to assemble simple series circuits that can be used to test the electrical conductivity of a number of materials, gathering, recording, classifying and presenting data in a variety of ways. **Progression** • Pupils can relate the results of experimentation to say whether a material is an electrical conductor or insulator. • Using the results of experimentation pupils can predict whether similar substances to those tested are electrical conductors or insulators e.g. all metals are conductors or all plastics are insulators. • Pupils can predict the electrical conductivity of a number of different materials including composite materials and use their knowledge and understanding of conductivity to explain the structure of electrical component such as wires or switches.

YEAR 5	
Topics/Themes/Texts:	**The key things we want children to know/be able to do**
Working Scientifically Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs Sc5/1.4 using test results to make predictions to set up further comparative and fair tests Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or argument	
Living Things and their Habitats Sc5/2.1a describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird Sc5/2.1b describe the life process of reproduction in some plants and animals.	Pupils compare the life cycles using the processes of fertilisation, and development to adulthood: – Mammal: internal fertilisation; internal development; live birth; infant; child; adolescent; adult* – Amphibian: external fertilisation; egg; external development; tadpole; frog-let; adult* – Insect: external fertilisation; egg; pupa; chrysalis; imago; adult* – Bird: internal fertilisation: egg: chick; fledgling; adult* * adult- capable of reproduction **Progression** • Pupils can describe in general terms the stages of development in one type of animal. • Pupils can compare the life cycles of two or more types highlighting similarities e.g. amphibians, birds and insects all lay eggs.

	• Pupils can accurately detail the life cycles of all types of animals comparing similarities and differences and making conclusions to the advantages and disadvantages of these differences. Pupils observe nature, conduct practical activities and use secondary sources to describe the processes of reproduction in plants and animals. **Progression** • Pupils can state that plants can reproduce sexually to produce seeds or asexually from bulbs and cuttings. • Animals reproduce sexually to give other animals. Micro-organisms e.g. bacteria reproduce asexually to produce exact copies. • Pupils describe sexual reproduction as involving male and female parts from two or more plants or animals (of the same species). • Pupils can accurately describe the processes of plant and animal sexual reproduction using the correct scientific vocabulary. Identifying the sexual components of flowering plants. (check school policy on sex • education).
Animals, including humans Sc5/2.2a describe the changes as humans develop to old age.	Pupils use observations, discussion with parents, grandparents and other adults as well as secondary sources to Create a human growth time line. **Progression** • Pupils can describe the development of humans over time in simple terms such as being a baby; being a child being and adult. • Pupils can ascribe approximate ages to the development of humans when: an infant; child; adolescent (teenager); adult; pensioner. • Pupils construct a detailed timeline ascribing significant processes to the thresholds between one phase of development and another e.g. the boundary between infant and child being the ability to walk or child to

	• adolescent being the ability to survive without support.
Properties and Changes of Materials Sc5/3.1a 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 Sc5/3.1b know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution Sc5/3.1 use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating Sc5/3.1d give reasons, based on evidence from comparative and fair tests, for the particular of everyday materials, including metals, wood and plastic Sc5/3.1e demonstrate that dissolving, mixing and changes of state are reversible changes Sc5/3.1f 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.	Working scientifically pupils compare through testing, categorising and recording data and results of increasing complexity and using with decision tree diagrams to sort a range of materials according to properties. **Progression** • Pupils can say why with reference to tabulated results why materials are grouped together. • Pupils demonstrate awareness that some properties will be categorised by everyday intended use e.g. wooden or plastic handles can be used on saucepans stating the need for the pan to conduct heat whilst the handle needs to insulate. • Pupils demonstrate a greater awareness that some properties will be categorised by intended use e.g. a plastic ruler can be transparent and flexible but durable whereas glass is transparent, durable but brittle. • Electrical wire comprises a metal conductor that is flexible and is covered with an insulator. (relate to work undertaken on electrical conductors/insulators in Year 4). Pupils make a series of observations working scientifically taking measurements and using a range of scientific equipment, with increasing accuracy and precision to demonstrate which materials will dissolve to form a clear solution; materials that dissolve and colour the solution and material that with form a mixture. **Progression** • Pupils can name three common materials that dissolve in liquid and explain that filtration and sieving will not separate them but the process of evaporation

	will. • Pupils will know that not all materials will dissolve whilst others do. Pupils can name examples of common materials that dissolve including examples i.e. instant coffee specifically designed to. Pupils can explain the process of evaporation to separate them. • Pupils know that not all materials will dissolve whilst others do even if a discoloured solution is the result. • Pupils can name examples of common materials that dissolve including examples such as Steradent Tablets • specifically designed to. Pupils can explain the process of evaporation to separate them and know that with addition heat the process can be accelerated. Using familiar substances pupils explore reversible changes, including, evaporating to separate dissolved solids. • Pupils use filtering to demonstrate that a material dissolved in a liquid cannot be separated by such means and the evaporation process is necessary. Pupils can investigate mixtures comprising solids with solids; solids with liquids and liquids with liquids (i.e. cooking oil and water). **Progression** • Pupils can explain how to separate to solids mixed together and how to filter a liquid and solid. Offer a reason why evaporation might be appropriate. • Pupils will respond with a suitable method to separate a given mixture saying why they have selected it. E.g. evaporation is needed for a sugar solution because it is a solution that cannot be separated by filtering but demonstrate when a filter would be practical. • Explain using for example that separating sugar strands from chick peas could be accomplished in two ways. • By sieving a dry mixture or 2) adding water and filtering then using their knowledge of evaporation to recover the sugar.

	Building on work in Year 1 and Year 2 where pupils identify materials used in their environment. Pupils investigate material properties investigating a range of properties including conductivity and insulation properties (Thermal and electrical). They will note through comparative testing material properties such as flexibility, if magnetic, suitability to be immersed in water and hardness. Working scientifically Pupils will report and present findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations§ using test results to make predictions to set up further comparative and fair tests to categorise materials by properties identified through investigation. **Progression** • Pupils explain with annotated sketches and tabulated results of categorisation material uses. • Pupils state why, using material properties e.g. their chair has a metal frame with plastic seat whilst the table with metal legs has a wood top covered with a smooth hard surface. Pupils will demonstrate a choice of • material to act as an insulator or conductor. • Pupils use a range of criteria pupils justify choices of material for particular uses, accurately and consistently explaining in terms of material properties. • Pupils investigate changes of state that are reversible to demonstrate the significant difference between melting and dissolving. Using chocolate, butter, candle wax and record with annotated sketches effects of heating and cooling. • Make comparisons with heating a salt water solution to evaporate the water, condensing the vapour to recover the salt free liquid and the salt, the original components. Pupils to demonstrate what happens when dissimilar liquids shaken or stirred and left to settle due to different densities. **Progression** • Name an everyday material that will melt if heated and will then solidify if cooled. • Pupils can name four materials that when heated will change state from solid

	to liquid and explain that cooling will be necessary to reverse the change. Pupils will name two materials that will dissolve and explain • how to recover the original component liquid and solid/liquid. • Pupils can relate reversible change to the water cycle and relate this to removal of salt from a solution created in the classroom using correct scientific vocabulary and simple models to describe scientific ideas. Pupils investigate change associated with heating mixtures to affect permanency with the change i.e. using ingredients to cook small cakes recording distinct changes. Mix a non-Newtonian fluid and record observations. Following guidelines for health and safety demonstrate the effect or burning of materials i.e. wood. Observe the effect of leaving steel/steel wool to rust and show examples of material change in the environment i.e. coins or copper left to form patina. Class teacher to show video or safely demonstrate an exothermic reaction i.e. Low percentage peroxide and yeast catalyst reaction. Pupils investigate and record outcome compare to the action of acid on bicarbonate of soda. **Progression** • Pupils plan a safe demonstration to show a permanent change in a material. • With reference to annotated drawings pupils explain permanent material change caused by heating, burning as a chemical reaction. • Pupils explain the processes of cooking in terms of mixing solids and liquid then heating to effect a permanent change. If bread is baked explain the effect of proving the dough prior to baking; bread • mouldering or other food decay as chemical change.
Earth and Space	Building upon the work in Year 3 pupils can explain why it is not safe to view the sun directly, even with sunglasses. Pupils can describe the sun as Sol, a heliocentric star at centre of our solar system

Sc5/4.1a describe the movement of the Earth, and other planets, relative to the Sun in the solar system Sc5/4.1b describe the movement of the Moon relative to the Earth Sc5/4.1c describe the Sun, Earth and Moon as approximately spherical bodies Sc5/4.1d use the idea of the Earth's rotation to explain day and night, and the apparent movement of the sun across the sky.	along with eight orbiting planets. **Progression** • Explain that looking directly at the sun is unsafe without specific reason. Using models (no necessary reference to scale) or suitable secondary source, demonstrate planetary motion. • Explain that looking directly at the sun is harmful and can damage the eye. Using appropriate models (no necessary reference to scale) or suitable secondary source, demonstrate planetary motion and moon orbit with anticlockwise motion. • Explain that looking directly at the sun is harmful and can damage the eye permanently. Using models (no necessary reference to scale) or suitable secondary source, demonstrate planetary motion with anticlockwise motion complete with an explanation of the earth's axial spin. The Earth along with other planets orbit the Sun with approximate concentric paths. Working scientifically pupils use a simple model to 1) one produced or acted out in class 2) an orrery or appropriate secondary source to describe the orbital motion of the moon. **Progression** • Describe the moon's orbit as describing a circular anticlockwise circle in a flat plane. • Describe the moon's orbit as describing a circular anticlockwise circle in a flat plane with duration of 29.5 days. • Describe the moon's orbit as describing an approximate circular anticlockwise path in a flat plane with duration of 29.5 days with a single axial spin on its own axis. Working scientifically using models pupils refer to a globe or appropriate spherical model compare with an equally sized rotating flat circle geographical map representation the sun, moon and earth and describe the difference.

	Progression • Describe with analogous terminology as being, for example ball shaped. • Describe the Sun, Earth and moon as spherical. • Describe the sun and moon as approximately spherical and the earth as an oblate spheroid. Referring to a globe or appropriate spherical model and single light source describe the shadow and how by rotating the spherical object parts will be illuminated. Use the model to explain that part will be in darkness and part illuminated and this will change with rotation anticlockwise. Plot observation of a sundial gnomon to track and record the Sun's apparent movement. Compare to a model to demonstrate with a small vertical gnomon appended to a spherical object moved in a circular path it is possible to record a similar effect. Observe effect using computer simulation e.g. Celestia. **Progression** • Describe how shadows change as the Sun appears to move across the sky. • With reference to models and observations explain in terms of the rotation of the Earth why shadows change and the Sun appears to move across the sky during the course of the day. • Explain times of sunrise and sunset in graphs and shadows can assist in demonstrating the Sun's apparent movement.
Forces Sc5/4.2a explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object	Make observations of a range of objects of different mass and shape dropped without addition thrust or downward force to record effect. Use secondary sources and models to discuss and report on the notion that independent of placement above the surface of the earth all objects that have mass will fall towards the earth's surface. **Progression** • Explain that any object dropped will fall towards the ground (outside) or floor surface inside.

Sc5/4.2b identify the effects of air resistance, water resistance and friction, that act between moving surfaces Sc5/4.2c recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	• Explain with the aid of diagrams, that objects that have mass will fall to the earth's surface once released. • This will include reference in annotated diagrams to objects not necessarily falling in a linear path i.e. comparing a sycamore seed with a paper cupcake case. • Explain with the aid of annotated diagrams of observations, that objects that have mass will fall to the earth's surface once released. Explain the effect of gravitational force in terms of how it affects natural phenomena e.g. precipitation, Autumn leaves falling, and intermediate forces demonstrating with sketches the effect of dropping a ball that bounces or temporary up-thrust from wind. Investigate and record data for a range of comparative tests using parachutes and paper helicopter designs of different dimensions. Investigate dragging and rolling objects on different textural surfaces. Investigate and record data for a range of comparative tests using a variety of boat designs and dropping different sized and shaped plasticine objects in a tube/column of water. **Progression** • Explain with diagrams for reference that movement of objects is affected by an additional force. As the resistance to movement increases the outcome can be observed and recorded. • Draw and annotate diagrams to illustrate forces acting on an object including the direction to show friction acts in the opposing direction to motion. • Explain with reference to investigations that frictional force opposes motion in the form of either air, water or between two surfaces in contact. Explain with reference to annotated sketches and graphs of data that surface area has an effect on force due to friction. Make observations and measurements using force meters of 1, 2 and 3 pulley systems to investigate mechanical advantage lifting 1 kg mass vertically. Make

	observations and measurements using force meters to investigate simple lever mechanisms on both mechanical advantage and distance travelled regarding load and position of fulcrum. Identify a range of household and everyday machines which allow a small force to have a greater effect: e.g. bottle openers can openers, wheelbarrow. **Progression** • Beginning: Draw and annotate diagrams. • Working within: Draw and annotate diagrams with generic terms i.e. lever, fulcrum, and pivot - tabulated results of investigation. • Secure: Draw and annotate diagrams with explanation– line graph results.
YEAR 6	
Topics/Themes/Texts:	**The key things we want children to know/be able to do**

Working Scientifically

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

Sc6/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

Sc6/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision

Sc6/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs

Sc6/1.4 using test results to make predictions to set up further comparative and fair tests

Sc6/1.5 using simple models to describe scientific ideas

Sc6/1.6 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations

Sc6/1.7 identifying scientific evidence that has been used to support or refute ideas or arguments.

Living Things and their habitats Sc6/2.1a describe how living things are classified into broad groups according to common observable characteristics and based on similarities and	Observable characteristics could include animals, habitat, diet, physical features e.g. endoskeleton or exoskeleton, number of legs etc. Plants: flowering/non flowering, habitat, wind/animal pollinated, deciduous or evergreen etc. **Progression** • Pupils distinguish between plants and animals grouping them in general terms.

differences, including micro-organisms, plants and animals Sc6/2.1b give reasons for classifying plants and animals based on specific characteristics.	• Give examples of the five taxonomic groups of vertebrate animals: amphibians, reptiles, fish, birds and mammals or invertebrates: insects. arachnids, crustacean, worms etc. using keys . • Pupils write multi-step identification keys to classify an appropriate range of plants and animals. Pupils suggest criteria that distinguish microscopic plants from microscopic animals e.g. the presence of chlorophyll in euglena. Use evidence from observations or secondary sources to explain reasons for classification. **Progression** • Pupils describe plants as being flowering or non-flowering; deciduous or evergreen: wind or animal pollinated. Animals as being vertebrate or invertebrate, warm or cold blooded. • Pupils describe animals as: o Having live births or laying eggs, in water or out. o Living on land or in water. o Having hair, fur, scales or feathers. • Pupils describe plants as: o Annual, biennial or perennial. o Fruit, cereal or vegetable giving reasons. • Pupils explain their own methodologies of classification of animals or plants using more than one factor.
Animals including humans	Building on work in Years 3 and Year 4 on the main body parts and internal organs; using secondary sources, models and analogies describe the circulatory system in terms of transport of essential materials around the body.

Sc6/2.2a identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood Sc6/2.2b recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function Sc6/2.2c describe the ways in which nutrients and water are transported within animals, including humans.	**Progression** • Pupils list the main parts of the circulatory system including: heart, vein, artery, arteriole, capillary. • Pupils accurately label a diagram of the circulatory system, annotating the heart as a 'double pump' with arteries running away from the heart, capillaries linking arteries to veins (in organs) and veins running towards the heart. • Pupils identify the materials carried by the blood using correct vocabulary i.e. nutrients not food, oxygen and carbon dioxide not air, water, waste, urea. Building on work in Year 2 on the importance for health of exercise and eating the right amounts of food; pupils use evidence from observations of practical activities or research from secondary sources to describe the impact of diet, exercise, drugs and lifestyle on the way their bodies function. **Progression** • Pupils list a number of factors both positive and negative that lifestyle might have on health. • Pupils describe the potential detrimental effects of under or over eating i.e. underdevelopment, anorexia, obesity leading to increased risk of type II diabetes, heart disease etc. • Pupils detail in scientific terms what is meant by a balanced diet and what the outcomes of having too much or too little of one particular food group might be. Pupils explain the physiological effect of a drug e.g. in terms of raised heart rate the effects of caffeine. Analyse the effects a range of lifestyle choices on health. Pupils use evidence from observations or research from secondary sources to explain how water is absorbed into the body through ingested material.

	Progression • Pupils state that soluble nutrients and water are carried in blood (plasma). • Pupils describe that nutrients and water are transported from the digestive system to all cells, tissues and organs through the circulatory system. • Pupils associate the soluble nutrients from ingested and digested food: sugars from carbohydrates; lipids from fats and amino acids from proteins that are transported.
Evolution and Inheritance Sc6/2.3a recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago Sc6/3.2b recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents Sc6/2.3c identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Building on the work undertaken in Year 3 on the use of fossil records to find fuels. **Progression** • Pupils describe how a fossil was formed and that some have common identifiable features with living things. legs, feathers, leaves, shells. • Pupils analyse a number of different fossils and identify features that might suggest which modern animals might have evolved from them. • Pupils compare fossils of different species within a genus suggesting how the families have changed over time. E.g. the tooth size of big cats or equine hoof shape (or where appropriate skull shape and size from Cro-Magnon to human) or instances where there has been little change over millions of years e.g. spiders in amber or fossils of ferns in sandstone. By building upon the work in Year 2 on offspring and personal experience of family and friends and by comparing images from a variety of secondary sources. **Progression** • Pupils can identify by reference to physical characteristics how human children look like parents and siblings. • Pupils can identify a distinguishing characteristic within family groups. Eg. Roman nose or Hapsburg jaw.

	• Pupils can describe varying characteristics within breeds e.g. curly haired Poodle and straight haired Labrador and predict what coat a Labradoodle has. What makes a rose a rose? Stripy zebra have uniquely striped offspring. Building upon work in Year 2 pupils use evidence from practical investigations, observations or research from secondary sources to give reasons why a plant or animal might be suited to its environment. **Progression** • Pupils can describe in simple terms the term adaptation and relate this to one factor e.g. deciduous trees lose their leaves in winter, coniferous trees have small needle shaped leaves cacti have fleshy stems to store water in a dry environment to reduce water loss. Elephants have big ears to help them stay cool. • Pupils can link a number of adaptations of a plant or animal has that increases its suitability to the environment e.g. an arctic fox having thick white fur as insulation and as camouflage to hide from predators or prey. • Pupils consider a number of different adaptations and make links to them being essential for survival over rivals thus leading to evolution e.g. research Galapagos finches or giant tortoise.
Light Sc6/4.1a recognise that light appears to travel in straight lines Sc6/4.1b 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	Pupils report findings from practical observations evidencing that light travels in straight lines. **Progression** • Pupils can make simple statements evidencing that light travels in straight lines e.g. if I put an opaque solid object in front of the light source the light is blocked and the object forms a shadow. • Pupils make statements about how light appears to travel based on observable evidence. e.g. light appears to travel in straight lies from a laser pointer or

Sc6/4.1c 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 Sc6/4.1d use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them	when seen in dust. • Pupils build/use more complex arguments with evidence from a number of sources to explain how light appears to travel in straight lines. Pupils draw conclusions from practical observations to evidence that objects are seen because light travels in straight lines and use diagrams or models to illustrate their ideas. **Progression** • Pupils can explain that in order for an object to be seen it either needs to give out or reflect light. e.g. they describe that they cannot be seen in a dark room until the light is turned on or they shine a torch at the observer. • Pupils can explain what is meant by a field of view and investigate ways in which they can widen this field of view using mirrors. • Pupils can suggest or devise demonstrations that show proof that light appears to travel in straight lines e.g. set up a series of card windows where a candle/light can be seen in straight lines only arrange a set of mirrors so that an image can be viewed from behind a screen at various points in a room. Pupils draw conclusions from practical observations to evidence that objects are seen because light travels from a light source to their eyes in straight lines and use diagrams or models to illustrate their reasoning. **Progression** • Pupils can identify a range of different light sources and confidently state whether the light is emanating from the source or is reflected light from a different source e.g. things in the night sky stars. aircraft lights as direct sources of light and the moon or satellites as light reflected. • Pupils can represent light as a line on diagram showing the path travelled as a straight line from the object to the eye. • Pupils can construct models or draw complex diagrams showing the path that

	light would take in a series of reflections in plane mirrors that would be found in a periscope to see over walls, around corners or behind yourself. Pupils can describe the positional interrelationship between light source, object and image in the production of shadows. **Progression** • Pupils can describe the size and shape of the shadow made by a number of different simple geometrical shapes i.e. a big square object will produce a big square shadow and a small triangular shape will produce a small triangular shadow. • Pupils can explain how the size of a shadow can be adjusted by moving the object closer or further away from the light source e.g. position two different sized squares so that they produce shadows of the same size. • Pupils can adjust the relative positions of objects and light sources including placing them at different angles from the perpendicular to change the size and dimensions of shadows at will as in a puppet theatre.
Electricity Sc6/4.2a associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit Sc6/4.2b 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	Pupils build upon the work on electric circuits in Year 4 to design and assemble simple series circuits that contain a varying number of cells, lamps and buzzers. **Progression** • Pupils can safely and independently construct simple series circuits giving some general statements about how changing the number of cells changes observable results. • Pupils can undertake simple 'fair test' investigations and make general quantitative statements about how increasing or decreasing the number of cells affects the brightness of the lamps or loudness of the buzzers. • Pupils work systematically to investigate the quantitative results of increasing the total voltage of the cells used in the circuit on the brightness of lamps or

Sc6/4.2c use recognised symbols when representing a simple circuit in a diagram.	the loudness of buzzers; producing reliable and repeatable results; accurately recording and reporting their findings. Pupils build upon the work on electric circuits in Year 4 to design and assemble simple series circuits that contain cells, lamps, buzzers and switches in varying positions around the circuit. **Progression** • Pupils can safely and independently construct simple series circuits giving some general statements about how changing order of the components or opening and closing switches changes observable results. • Pupils can undertake simple 'fair test' investigations and make general quantitative statements about how changing the positions or order of the components affects the brightness of the lamps or loudness of the buzzers. • Pupils work systematically to design and investigate a circuit to fulfil a specific task by changing the position of components, the total voltage of the switches or cells used in the circuit noting the brightness of lamps or the loudness of buzzers; recording and reporting their findings. Pupils might suggest additional components and explore the effects of adding additional components e.g. a dimmer switch (variable resistor). • Pupils represent electrical components with pictures or symbols. **Progression** • Pupil representations of electrical components are a mixture of pictures and symbols of their own design with or without a key. • Pupils use a mixture pictures, symbols of their own design and standard symbols to represent electrical components including a key. • Pupils accurately and consistently use standard symbols. Wires connecting components are drawn with straight lines.