Science Scheme of Work

Buckstones Community Primary School

Science Medium Term Plans

September 2017

Science Scheme of Work

EYFS - Autumn		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically Skills ELG Understanding the World - The World	Observing closely Can they talk about themselves? Can they talk about growth and changes over time?	To develop an understanding of our senses and how we use them • Providing a range of objects to look at, smell, taste, listen to and touch Sight • Magnifiers, colour paddles, mirrors Hearing • Having access to a range of instruments • Making own instruments • 'Guess the instrument' listening game • 'Who am I' game • Going on a listening walk • Sounds lotto Smell • Different objects to smell • 'Guess what it is' – things in pots covered in foil with holes (e.g. mints, nutmeg, cheese and onion crisps etc.) • Guess what's for dinner – what can you smell? Taste • Comparing likes and dislikes – choose items to decorate gingerbread biscuits. Touch • Feely bag • Texture collage • Comparing textures of fabrics (clothes)

		• Making rubbings
	Can they talk about why things occur? Can they talk about changes with plants? Can they talk about changes with animals?	Looking at changes in the seasons – Autumn walk. Collect and look at Autumn leaves, conkers, pine cones. Children can make collages with the items. Look at the changes outside – trees are bare. Talk about nocturnal animals – why are they different.
	Can they talk about features of their own environment? Can they talk about similarities and differences between places or environments?	• Go on an Autumn walk, what do the children notice is happening to their environment? And why? Look at pictures of the changing seasons - can the children tell you what changes they can see - colour of the leaves, leaves falling from the trees, bare trees, different types of fruit. • Ask children have they noticed any changes in the morning when they get up & at night when they go home - encourage them to talk about the dark mornings which makes it feel like night-time, & how it is dark soon after they go home. Walk around the school inside and outside – take photographs. Talk about the different areas in school. Children talk about their favourite areas in school and why they like them. Focus on forest activities – the environment outside and how we can look after our school i.e. not dropping litter
	Can they talk about why things happen?	• Explore colour & light using bubbles, kaleidoscope, Investigate rainbows - made with a prism or a clear plastic beaker of water which catches the light on a windowsill. • Use spinners, some colour, some black and white. What

		happens to the colours when they are spun? • Look .for patterns in nature eg. Zebras, butterflies, ladybirds etc. • Talk about how certain colours are associated with certain things eg. Red for danger or warnings • As seasonal activities begin collect autumn leaves, conkers, pine cones etc. Let the children look more closely at some of the natural items they have collected using a magnifying glass - the veins on the leaves, a piece of bark. Let the children take magnifying glasses out into the environment.

Science Scheme of Work

EYFS - Spring		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically Skills ELG Understanding the World - The World	Observing closely Can they talk about their observations of animals? Can they talk about growth, decay and changes over time?	Observing closely the life cycle of the butterflies. Focus on the changes of the creature and that the cycle means it keeps repeating. Nocturnal animals – how some animals come out at night. Look at clips of animals. Make models and pictures of nocturnal animals.
	Can they talk about why things occur?	Looking at weather changes – exploring snow/ rain/ sunshine.
	Can they talk about features of their own environment?	Spring time walk – look at changes in the environment, flowers/trees/creatures. People who help us – how police/fire fighters help in our environment. Compare to people further away.Look at farmers producing food for supermarkets/RNLI/mountain rescue
Scientific knowledge and Understanding ELG Understanding the World - The World	Can the show care and concern for living things and the environment?	Life cycles – butterflies and frogs. Looking after the creatures. Talking about what they need to survive/ food/ habitat. Forest fun activities – looking after creatures we find when exploring.

	Can they talk about similarities between some objects and materials? Can they talk about differences between some objects and materials?	Looking at materials for police officers uniform – testing out water proof materials. Looking at changes in materials – baking chocolate nests. Melting chocolate, changing properties.

Science Scheme of Work

EYFS - Summer		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically Skills ELG Understanding the World - The World	Observing closely Can they talk about their observations of animals? Can they talk about growth, decay and changes over time?	Farm visit – looking at the different creatures. Finding out about where the creatures live, what they eat etc. Looking at how animals look after their young, how they grow and when they die. Some animals are used for food for humans or other animals – prey.
	Can they talk about features of their own environment? Can they talk about similarities and differences between places or environments?	School environment Looking at the changes in the seasons – new growth, weather etc. Looking at creatures – minibeast hunt. Where water comes from – looking at all the places we can find water and why water is important for life of people, animals, plants and the world. Looking at creatures/animals from different places talk about the environments and why the creatures live in certain places – polar animals/ sea creatures/ jungle animals – look at the clips of the creatures in their environment.
	Can they talk about why things happen?	Investigating water – using the big book to find out about and explore water. Experimenting with melting

		ice, colouring water, freezing water.
Scientific knowledge and Understanding ELG Understanding the World - The World	Can they talk about similarities between living things? Can they talk about differences between living things? Can the show care and concern for living things and the environment?	Finding out about animals – farm visit, minibeast hunt. Looking at creatures/animals from different places talk about the environments and why the creatures live in certain places – polar animals/ sea creatures/ jungle animals – look at the clips of the creatures in their environment.

Science Scheme of Work

Year 1 Autumn –Animals, including humans		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Statutory requirements: Pupils should be taught to: • identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • identify and name a variety of common animals that are carnivores, herbivores and omnivores • Pupils should be taught to: • describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) • identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.		
Working Scientifically (Skills)	**Observing Closely**: * Can they talk about what they see, touch, smell? * Can they use simple equipment to help them make observations? * Can they observe carefully, using simple equipment, perhaps magnifying glasses? Challenge: Can they find out by watching, listening, tasting, smelling and touching? **Performing Tests**: * Can they perform simple tests? * Can they tell other people about what they have done? Challenge: Can they give a simple reason for their answers? **Identifying & Classifying**: * Can they identify and classify things they observe? * Can they think of some simple questions to ask? * Can they think of some scientific questions to ask? * Can they use their observations and ideas to suggest answers to their	**Introduction to the topic** **what do we already know about animals and *humans* – what do we *want* to find out?** **Use 'Head, shoulders, knees and toes' song as a stimulus. Outside work in small groups to draw around each other with chalk and label key features such as head, leg, arm etc** **Children to independently label all the parts of the body they already know on a photograph of themselves.**

	questions? * Do they recognise that some questions can be answered in different ways? * Can they explain what they have found out? Challenge: Can they talk about similarities and differences? Can they explain what they have found out using scientific vocabulary? **Recording Findings:** * Can they show their work using pictures, labels and captions? * Can they gather and record data to help in answering questions? * Can they record their findings using standard units? * Can they put some information in a chart or table? Challenge: Can they use ICT to show their workings? Can they make accurate measurements?	**Compare each other: in what ways are we all the same and how are we different – can we order the class in different ways (height/ age) and can we group the class in different ways (eye/hair colour etc.).** **Senses** **what are the 5 senses? Use the 5 senses to describe our classroom.** **Focus on sight and touch – use blindfold, describe how it feels. Children use only their sense of touch to describe and guess a range of mystery objects.** **Taste. Taste, describe and compare 4 contrasting tastes (sweet, sour, salty, bitter).** **Link to DT – making our own fruit salads, choosing favourite fruits from a range that we've tasted.** **Sound. Discuss as a class different sounds, sounds we like/dislike. Children to independently sort a set of pictures into lists of sounds they like and sounds they**
Additional Guidance	• Pupils should use the local environment throughout the year to explore and answer questions about animals in their habitat. They should understand how to take care of animals taken from their local environment and the need to return them safely after study. • Pupils should become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets. • Pupils should have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes. • Pupils might work scientifically by: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.	

Animals including Humans: Scientific Knowledge and Understanding	* Can they point out some of the differences between different animals? * Can they sort photographs of living things and non-living things? * Can they identify and name a variety of common animals? (birds, fish, amphibians, reptiles, mammals, invertebrates? * Can they describe how an animal is suited to its environment? * Can they identify and name a variety of common animals that are carnivores, herbivores and omnivores? * Can they name the parts of the human body that they can see? * Can they draw and label basic parts of the human body? * Can they identify the main parts of the human body and link them to their senses? * Can they name the parts of an animal's body? * Can they name a range of domestic animals? * Can they classify animals by what they eat? (carnivore, herbivore, omnivore) * Can they compare the bodies of different animals? Challenge: Can they name the same parts of the human body that cannot be seen? Can they say why certain animals have certain characteristics? Can they	**dislike.** **Smell. Discuss as a class smells we love/hate. Children to use their sense of smell to describe a range of several different strong smelling products.** **Animals** **Animal riddles- can we guess the animals from reading a list of clues – link to literacy, writing own animal riddles for favourite animals.** **Pets: Which animals are commonly kept as pets in the UK? Collect data as a class to create own pictogram.** **Sort animals into different groups – appearance based eg no. of legs, feathers/fur etc.** **Sort animals into different groups – carnivore/herbivore/omnivore. Ensure that humans are included.** **Conclusion**

	name a range of wild animals? <u>Challenge</u>: Can they begin to classify animals according to a number of given criteria? *Can they point out the differences between living things and non-living things?	**Review of the topic- go back and review original questions- what have we learned? What have we enjoyed?** **Is there anything else the children would like to find out?** **End of topic assessments.**

Science Scheme of Work

Year 1 Spring – Everyday Materials		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Statutory requirements: Pupils should be taught to: • distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday materials • compare and group together a variety of everyday materials on the basis of their simple physical properties		
Working Scientifically (Skills)	**Observing Closely**: * Can they talk about what they see, touch, smell? * Can they use simple equipment to help them make observations? * Can they observe carefully, using simple equipment, perhaps magnifying glasses? Challenge: Can they find out by watching, listening, tasting, smelling and touching? **Performing Tests**: * Can they perform simple tests? * Can they tell other people about what they have done? Challenge: Can they give a simple reason for their answers? **Identifying & Classifying**: * Can they identify and classify things they observe? * Can they think of some simple questions to ask? * Can they think of some scientific questions to ask?	**Introduction to the topic** **Introduce the term 'materials', discuss in particular the term fabric (and that material is often used by mistake for fabric). Create a class list of all materials that we know of.** **Identifying and investigating materials** **Children to work in pairs to do a materials search of our classroom/school, focusing particularly on wood, metal, plastic and fabric. Which other materials can we find?**

	* Can they use their observations and ideas to suggest answers to their questions? * Do they recognise that some questions can be answered in different ways? * Can they explain what they have found out? Challenge: Can they talk about similarities and differences? Can they explain what they have found out using scientific vocabulary? **Recording Findings:** * Can they show their work using pictures, labels and captions? * Can they gather and record data to help in answering questions? * Can they record their findings using standard units? * Can they put some information in a chart or table? Challenge: Can they use ICT to show their workings? Can they make accurate measurements?	**Use the senses of sight and touch to describe different materials. Each table set up with a range of different objects made from wood, metal, plastic and fabric, children to rotate around the classroom choosing appropriate adjectives to describe each material group.** **Properties of materials** **Discuss simple properties of materials such as shiny, bendy, see-through, soft, hard, waterproof. Children to work in pairs to test a range of materials and tick off the appropriate properties for each one.** **Discuss where particular materials come from, introduce the terms man-made and natural, using BBC video clip to support. Children to then work in pairs to sort a range of materials into 2 groups: man-made and natural.** **Problem=solving** **(link to Literacy) The Three Little Pigs. Children to work in small groups to**
Additional Guidance	Non-statutory Guidance: * Pupils in years 1 and 2 should explore the world around them and raise their own questions. * They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. * They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships. * They should ask people questions and use simple secondary sources to find answers. They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. * With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language.	

	Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. * Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil. * Pupils might work scientifically by: performing simple tests to explore questions, for example: 'What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?'	**construct their own houses made out of unusual materials. When complete use the big bad wolf hairdryer to try and blow them down. Which houses survived the wind? – *why?*** **Discuss buildings with the children. What materials are their houses/the school made from? Walk around the school looking for different materials, list them and discuss why they might be the best material for the job.**
Everyday Materials: Scientific Knowledge and Understanding	* Can they distinguish between an object and the material from which it is made? * Can they describe materials using their senses? * Can they describe materials using their senses, using specific scientific words? * Can they explain what material objects are made from? * can they explain why a material might be useful for a specific job? * Can they name some different everyday materials? eg. wood, plastic, metal, water and rock * Can they sort materials into groups by a given criteria? * Can they explain how solid shapes can be changed by squashing, bending, twisting and stretching? Challenge: * Can they describe things that are similar and different between materials? * Can they explain what happens to certain materials when they are heated? eg. bread, ice, chocolate * Can they explain what happens to certain materials when they are cooled? Eg. jelly, heated chocolate.	**Discuss why certain materials are chosen for certain purposes e.g. glass for window panes and fabric for socks. Children to choose from a range of objects and explain why it is made from the particular material.** **Floating and sinking: take the class outside to experiment in the water area. Children to first predict whether they think a material will float or sink. Test each material, were there any surprises?** **Conclusion**

		Review of the topic- go back and review original questions- what have we learned? What have we enjoyed? **Is there anything else the children would like to find out?** **End of topic assessments.**

Science Scheme of Work

Year 1 Summer – Plants		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Statutory requirements: Pupils should be taught to: • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees		
Working Scientifically (Skills)	**Observing Closely:** * Can they talk about what they see, touch, smell? * Can they use simple equipment to help them make observations? * Can they observe carefully, using simple equipment, perhaps magnifying glasses? Challenge: Can they find out by watching, listening, tasting, smelling and touching? **Performing Tests:** * Can they perform simple tests? * Can they tell other people about what they have done? Challenge: Can they give a simple reason for their answers? **Identifying & Classifying:** * Can they identify and classify things they observe? * Can they think of some simple questions to ask? * Can they think of some scientific questions to ask? * Can they use their observations and ideas to suggest answers to their questions? * Do they recognise that some questions can be answered in different ways? * Can they explain what they have found out?	**Introduction to the topic** **Introduce the topic and discover what the children already know about plants. Collate a class/group lists of different plants that they know.** **Link to Literacy (Jack and the Beanstalk), each child to follow instructions to plant their own bean. Use the following weeks to look after their own beanstalks and follow their growth. Will anyone's beanstalk grow tall enough to reach their castle at the top?!** **Parts of a plant:** **Establish the main parts that flowering plants have – leaves, roots, stems and**

	Challenge: Can they talk about similarities and differences? Can they explain what they have found out using scientific vocabulary? **Recording Findings:** * Can they show their work using pictures, labels and captions? * Can they gather and record data to help in answering questions? * Can they record their findings using standard units? * Can they put some information in a chart or table? Challenge: Can they use ICT to show their workings? Can they make accurate measurements?	**flower. Talk about their functions. Look in detail at some flowering plants – colour, texture, shape. Children draw & label simple plants. Use the' flower' version of 'Head, shoulders, knees and toes' song as a fun stimulus to get the children to remember the parts.**
Additional Guidance	**Non-statutory Guidance:** • Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted. • They should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem). • Pupils might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees. • Pupils might keep records of how plants have changed over time, for example the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants.	**Wild/garden plants:** **Discuss the difference between wild (introduce term 'weeds') and garden plants before going on a walk of the local area and recording which plants we can see – classifying into wild/garden.** **Help children identify & name other plant parts, e.g. petals, twigs, buds.** **Trees:** **Look in detail at tree bark & the overall shape of trees. Do bark rubbings. Show them a range of tree paintings before giving them the opportunity to paint their own.**
Plants Scientific Knowledge and	* Can they name the petals, stem, leaf, bulb, flower, seed, stem and root of a plant?	**Introduce the terms evergreen and deciduous. Explain that all trees fall into one of these two categories. Show**

Understanding	* Can they identify and name a range of common plants and trees? * Can they recognise deciduous and evergreen trees? * Can they name the trunk, branches and root of a tree? * Can they describe the parts of a plant (roots, stem, leaves, flowers)? Challenge: Can they name the main parts of a flowering plant?	**examples of leaves from both types of tree, then give the children tree identification checklists to take part in a walk of the school grounds to see which trees we can find and name by looking at their leaf shape.** **Use leaves collected on the tree identification walk to do leaf rubbings and label the name of the type of tree it came from.** **Conclusion** **Review of the topic- go back and review original questions- what have we learned? What have we enjoyed?** **Is there anything else the children would like to find out?** **End of topic assessments.**

Science Scheme of Work

Year 2 Autumn Term- Animals, including humans		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically (skills)	**Observing closely** Can they use, see, touch, smell, hear or taste, to help them answer questions? Can they use some scientific words to describe what they have seen and measured? Can they compare several things? **Can they suggest ways of finding out through listening, hearing, smelling, touching and tasting?** **Performing tests** Can they carry out a simple fair test? Can they explain why it might not be fair to compare two things? Can they say whether things happened as they expected? Can they suggest how to find things out? Can they use prompts to find things out? **Can they say whether things happen as they expected and if not why not?** **Identifying and classifying** Can they organise things into groups? Can they find simple patterns (or associations) Can they identify animals and plants by specific criteria, e.g., lay eggs or not; have feathers or not? **Can they suggest more than one way of grouping animals and plants and explain their reasons?** **Recording findings**	Investigation to discover which is the most effective way of removing dirt from our hands? Children to plan the investigation in small groups and then reach a concensus of opinion as to the best way to carry out the test. How will we make the test a fair one? (same amount of water, same amount of soap, same amount of rubs etc) Compare soaps and their effectiveness. Children to compare their predictions with what actually happened. Discuss how humans have babies that grow into adults & emphasise that they grow & develop. Talk through stages: baby, toddler, child, teenager, adult. Children think about how they have changed

	Can they use text, diagrams, pictures, charts, tables, to record their observations? Can they measure using simple equipment? **Can they use information from books and online information to find things out?**	since they were babies. **Find out whether taller children have bigger feet.**
Notes and guidance	Pupils in Year 1 and 2 should explore the world around them and raise their own questions. They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships. They should ask people questions and use simple secondary sources to find answers. They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language. These opportunities for working scientifically should be provided across years 1 and 2 so that the expectations in the programme of study can be met by the end of Year 2. Pupils are not expected to cover each aspect for every area of study.	
Scientific knowledge and understanding	Can they describe what animals need to survive? Can they explain that animals grow and reproduce? Can they explain why animals have offspring which grow into adults?	**Lesson 1-Our bodies** Discuss how humans have babies that grow into adults & emphasise that they grow & develop. Talk through stages: baby, toddler, child, teenager,

	Can they describe the life cycle of some living things? (e.g. egg, chick, chicken) Can they describe how animals obtain their food from plants and other animals, using the idea of a simple food chain? Can they identify and name different sources of food. Can they identify and name a variety of animals in their habitats? Can they explain the basic needs of animals, including humans for survival? (water, food, air) Can they describe why exercise, balanced diet and hygiene are important for humans? **Can they explain that animals reproduce in different ways?**	adult. Children think about how they have changed since they were babies. Find out whether taller children have bigger feet. **Lesson 2-Frog life Cycle** Study the life cycle of a frog in detail. Children draw, order & label life cycles & sequence life cycles online. They make a tadpole that can metamorphose into a frog, an origami frog & match various baby animals to the relevant adults. **Lesson 3-Butterfly life Cycle** Read The Very Hungry Caterpillar to kick start this session. Then study the life cycle of a butterfly in detail. Chn draw & label a butterfly life cycle, colour butterflies online & create symmetrical butterfly paintings. Compare with dragonfly cycle. **Lesson 4-Chicken life Cycle** Study another different life cycle – that of a chicken. Look in detail at an egg & draw & label it & find out how the chick embryo develops in the egg. Match other baby animals with the relevant adults. Look at a variety of birds' eggs. **Lesson 5-Basic needs** What do all animals need to survive? Basic survival needs – water, food, air (& shelter). Find out about looking after pets, zoo animals, farm animals & their young. Welcome a guest speaker &/or a pet to the classroom. Children draw & find out about pets. **Lesson 6-Food Groups**

		One thing humans need to survive is a balanced diet. Discuss food groups & what each type of food is needed for. Children draw their own representation of balanced diet. Make a fruit juice survey, collect the data & graph the results. Start a food diary. **Lesson 7-Balanced Diet** Sort a selection of foods/food labels. Find out which foods we can eat a lot of & which should be eaten sparingly. Discuss children's food diaries sensitively. Children draw the contents of a healthy lunch box & design their own lid. **Lesson 8-Keeping Fit** Humans (and other animals) need exercise to be fit & healthy. Talk about why exercise is important for our muscles, bones & heart (which is also a muscle). Find out how exercise affects our bodies. Discuss children's favourite ways of exercising. **Lesson 9-Hygiene** We need enough rest to stay healthy, so bedtime is important! Create a life-size pictogram of bedtimes. Discuss how keeping clean also helps us to stay healthy. Investigate hand washing. Mention that medicines can also help us to stay well.
Notes and guidance	Pupils should be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. They should also be introduced to the processes of reproduction and growth in animals. The focus at this stage should be on questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs.	

	The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager, adult. Pupils might work scientifically by: observing, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions.	

Science Scheme of Work

Year 2- Spring Uses of everyday materials		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically (skills)	**Observing closely** Can they use, see, touch, smell, hear or taste, to help them answer questions? Can they use some scientific words to describe what they have seen and measured? Can they compare several things? **Can they suggest ways of finding out through listening, hearing, smelling, touching and tasting?** **Performing tests** Can they carry out a simple fair test? Can they explain why it might not be fair to compare two things? Can they say whether things happened as they expected? Can they suggest how to find things out? Can they use prompts to find things out? **Can they say whether things happen as they expected and if not why not?** **Identifying and classifying** Can they organise things into groups? **Recording findings** **Can they use text, diagrams, pictures, charts, tables, to record their observations?** Can they measure using simple equipment? **Can they use information from books and online information to find things out?**	Use the sense of touch and sight to examine a variety of materials- introduce new vocabulary rigid, flexible, opaque, translucent, reflective. Compare fabrics. Which material is the most waterproof? Which materials are we going to test? What are we going to use? Children to discuss which things need to be kept the same e.g same amount of water, same size containers, same amount of layers. Children to give reasoned predictions. Children to record findings about how materials can be changed by twisting, turning, squashing and bending.

Notes and guidance	Pupils in Year 1 and 2 should explore the world around them and raise their own questions. They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships. They should ask people questions and use simple secondary sources to find answers. They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language. These opportunities for working scientifically should be provided across years 1 and 2 so that the expectations in the programme of study can be met by the end of Year 2. Pupils are not expected to cover each aspect for every area of study.	
Scientific knowledge and understanding	Can they explore how the shapes of solid objects can be changed? (squashing, bending, twisting, stretching) Can they find out about people who developed useful new materials? (John Dunlop, Charles Macintosh, John Macadam) Can they identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, and paper, cardboard for particular uses? Can they explain how things move on different surfaces?	**Lesson 1-Material Properties** Rehearse the use of the word material in science. Identify objects made from a range of everyday materials. Reinforce the fact that similar objects can be made from different materials, e.g. rulers, sharpeners. Link properties to the uses of materials. **Lesson 2-Uses of materials**

		Continue the theme of linking properties of materials to their uses. Use an umbrella as an example of several materials used for one object. Compare spoons made from wood, plastic & metal. Children draw an object & describe what it is made from & why. **Lesson 3- Fabrics** Look at a range of different fabrics using touch, sight & smell. List vocabulary that describes them. Investigate the symbols used on clothes labels. Distinguish between natural & man-made fabrics & where they come from/are made. Try knitting & weaving! **Lesson 4- Suitable Fabrics** Use a fiction book describing a character wearing lots of different clothes to introduce the concept of clothing that is suitable for a particular activity/climate. Identify specialist clothes. Pack suitable holiday clothes & dress an outline figure. **Lesson 5- Scientists** Find out about some scientists who developed new materials that are useful: John Boyd Dunlop, John Loudon McAdam & Charles Macintosh. Using Macintosh as a stimulus children set up an enquiry to find which materials are waterproof (& absorbent if time). **Lesson 6- Forces**

		Identify pushes & pulls as simple forces. Use a Plasticine ball to show children how the shape of a solid object can be changed by bending, squashing, twisting & stretching (pushes/pulls). **Lesson 7- Plastics** Study a range of objects made of different plastics. Discuss properties that make plastic useful for making a variety of things. Children become Plastic Detectives in the classroom. Play Kim's game with 20 plastic items. **Lesson 8- Recycling** Discuss difficulties of disposal of plastics. Look at symbols used to show which type of plastic an object is made from & find out if they can be recycled in your area. Chn design posters showing how to reuse plastic bottles. Discuss use of plastic bags. **Lesson 9- New uses** Discuss upcycling as a way of converting waste materials into new materials or products. Use loom bands as an e.g. of a new use of rubber bands. Challenge children to think of unusual/creative uses of other everyday items. Children design, make & present their ideas.
Notes and guidance	Pupils should identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins,	

	cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass). They should think about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials. Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam. Pupils might work scientifically by: comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.	

Science Scheme of Work

Year 2-Summer 1 Living things and their habitats		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically (skills)	**Observing closely** Can they ask simple questions and recognising that they can be answered in different ways? Can they observe closely, using simple equipment? Can they use, see, touch, smell, hear or taste, to help them answer questions? Can they use some scientific words to describe what they have seen and measured? Can they compare several things? **Can they suggest ways of finding out through listening, hearing, smelling, touching and tasting?** **Performing tests** Can they carry out a simple fair test? Can they explain why it might not be fair to compare two things? Can they say whether things happened as they expected? Can they suggest how to find things out? Can they use prompts to find things out? **Can they say whether things happen as they expected and if not why not?** **Identifying and classifying** Can they organise things into groups? Can they find simple patterns (or associations) Can they identify animals and plants by specific criteria, e.g., lay eggs or not; have feathers or not? **Can they suggest more than one way of grouping animals and**	Give children the opportunity to carry out an enquiry to see what affects the number of a chosen minibeast in a habitat using a choice chamber. Suggested enquiries involve woodlice, meal worms, worms or snails. Children draw conclusions from their findings.

	plants and explain their reasons? **Recording findings** Can they use their observations and ideas to suggest answers to questions? **Can they use text, diagrams, pictures, charts, tables, to record their observations?** Can they gather and record data to help in answering questions? Can they measure using simple equipment? **Can they use information from books and online information to find things out?**	
Notes and guidance	Pupils in Year 1 and 2 should explore the world around them and raise their own questions. They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships. They should ask people questions and use simple secondary sources to find answers. They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language. These opportunities for working scientifically should be provided across years 1 and 2 so that the expectations in the programme of study can be met by the end of Year 2. Pupils are not expected to cover each aspect for every area of study.	

Scientific knowledge and understanding	Can they match certain living things to the habitats they are found in? Can they explain the differences between living and non-living things? Can they describe some of the life processes common to plants and animals, including humans? Can they decide whether something is living, dead or non-living? (never been alive?) Can they identify that most living things live in habitats, including micro-habitats to which they are suited? Can they describe how a habitat provides for the basic needs of things living there? Can they describe a range of different habitats? Can they describe how plants and animals are suited to their habitat? **Can they name some characteristics of an animal that help it to live in a particular habitat?** **Can they describe what animals need to survive and link this to their habitats?**	**Alive or Dead** Discuss with children how we know that something is alive. Introduce some life processes of animals & plants (i.e. organisms). Explore what animals and plants need to stay alive and healthy. Introduce children to the idea that all living things are made of cells. **Life Processes** Look in more detail at the characteristics of living things using MRS NERG as a reminder of the seven life processes: movement, reproduction, sensitivity, nutrition, excretion, respiration & growth. Read & add to a poem. Children draw & act out life processes. **Living v non-living** Sort a range of things into living and non-living. Include objects that were alive once, e.g. dead leaf, wooden ruler, cotton T-shirt & discuss what they were part of. Children identify living & non-living things around school & draw & label some for display. **Habitats** Recap on the basic needs of animals & plants to keep them alive & healthy. Establish that plants & animals live in particular habitats which serve their needs. Discuss how many animals provide the needs of their offspring initially & how we help pets.

		Dependency Explain that animals & plants depend on each other for survival in their habitats. Animals depend on plants for food & shelter & plants depend on animals for seed dispersion. Children draw an oak tree & its animal dependents plus seeds spread by animals. **Local Habitats** Locate the different habitats in the school environment, including micro-habitats, e.g. under a log or stone, in leaf litter. Identify plants & minibeasts found in these locations. Discuss responsible behaviour when collecting minibeasts/plants. **Other Habitats** Compare the plants & animals found in local habitats with those found further afield, e.g. the seashore, an ocean, a rainforest, a woodland or a desert. Go on a real or virtual field trip to a contrasting habitat! Children research living things in a habitat. **Habitat Enquiry** Give children the opportunity to carry out an enquiry to see what affects the number of a chosen minibeast in a habitat using a choice chamber. Suggested enquiries involve woodlice, meal worms, worms or snails. Children draw conclusions from their findings. **Food Chains** Remind children that a suitable food source is one

		of the main criteria for animals to survive in a particular habitat. Plants make their own food, but animals eat plants &/or other animals. Introduce vocabulary involved & study some simple food chains.
Notes and guidance	Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things. Pupils should be introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter). They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest. Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions for example: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions. They could construct a simple food chain that includes humans (e.g. grass, cow, human). They could describe the conditions in different habitats and micro-habitats (under log, on stony path, under bushes) and find	

	out how the conditions affect the number and type(s) of plants and animals that live there.	

Science Scheme of Work

Year 2 Summer 2 Plants		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically (skills)	**Observing closely** Can they use, see, touch, smell, hear or taste, to help them answer questions? Can they use some scientific words to describe what they have seen and measured? Can they compare several things? **Can they suggest ways of finding out through listening, hearing, smelling, touching and tasting?** **Performing tests** Can they carry out a simple fair test? Can they explain why it might not be fair to compare two things? Can they say whether things happened as they expected? Can they suggest how to find things out? Can they use prompts to find things out? **Can they say whether things happen as they expected and if not why not?** **Identifying and classifying** Can they organise things into groups? Can they find simple patterns (or associations) Can they identify animals and plants by specific criteria, e.g., lay eggs or not; have feathers or not? **Can they suggest more than one way of grouping animals and plants and explain their reasons?** **Recording findings**	**Germination and Growth requirements** Two of the characteristics of livings things are reproduction and growth. Children plant some seeds and bulbs under a range of conditions in order to investigate what they need to germinate and then continue growing healthily. Children make predictions. **Plant Enquiry** Observe plants & discuss the findings of their enquiry. Draw/write about results. Together conclude that plants need water, air & a suitable temperature to germinate & that plants need water, light, air & a suitable temperature to grow & remain healthy.

	Can they use text, diagrams, pictures, charts, tables, to record their observations? Can they measure using simple equipment? **Can they use information from books and online information to find things out?**	
Notes and Guidance	Pupils in Year 1 and 2 should explore the world around them and raise their own questions. They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships. They should ask people questions and use simple secondary sources to find answers. They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language. These opportunities for working scientifically should be provided across years 1 and 2 so that the expectations in the programme of study can be met by the end of Year 2. Pupils are not expected to cover each aspect for every area of study.	
Scientific knowledge and understanding	Can they describe what plants need to survive? Can they observe and describe how seeds and bulbs grow into mature plants? Can they find out and describe how plants need water, light and a	**Plants** Start this strand by rehearsing the basic structure of plants: stem, leaf, root, trunk and flower. Compare the characteristics of plants with

	suitable temperature to grow and stay healthy? **Can they describe what plants need to survive and link it to where they are found?** **Can they explain that plants grow and reproduce in different ways?**	animals to highlight that they are living things. Name some common plants and discuss their uses. **Germination and Growth requirements** Two of the characteristics of livings things are reproduction and growth. Children plant some seeds and bulbs under a range of conditions in order to investigate what they need to germinate and then continue growing healthily. Children make predictions. **Seeds** Establish that seeds are formed to produce new plants (reproduce). Children look at a variety of seeds and examine one closely with a hand lens. They make a careful observational drawing of that seed. Make a collage using seeds. Record changes in seeds/bulbs. **Seeds** Open up a broad bean or sunflower seed to find out what is inside it. Make a careful observational drawing of the inside of a seed. Watch time-lapse photography of a seed germinating. Record changes in seeds/bulbs. Challenge chn to grow a tall sunflower! **Inside a seed** Agree that light is not required for germination (based on chn's enquiry). Discuss how leaves make food for the plant using sunlight, water & air. Collect a variety of green leaves & try to match the colours with paint/wool. Record changes in seeds/bulbs.

		Leaves Agree that light is not required for germination (based on children's enquiry). Discuss how leaves make food for the plant using sunlight, water & air. Collect a variety of green leaves & try to match the colours with paint/wool. Record changes in seeds/bulbs. **Walk in the environment** Take children on a late spring/early summer walk to observe flowers and seeds. Include trees in their search. Children sketch some flowers & seeds in situ & colour in later. Collect some seeds to observe & identify in classroom. Record changes in seeds/bulbs. **Plant Enquiry** Observe plants & discuss the findings of their enquiry. Draw/write about results. Together conclude that plants need water, air & a suitable temperature to germinate & that plants need water, light, air & a suitable temperature to grow & remain healthy.
Notes and guidance	Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things. Pupils should be introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and	

	'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter). They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest. Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions for example: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions. They could construct a simple food chain that includes humans (e.g. grass, cow, human). They could describe the conditions in different habitats and micro-habitats (under log, on stony path, under bushes) and find out how the conditions affect the number and type(s) of plants and animals that live there.	

Science Scheme of Work

Year 3- Animals including Humans (Autumn)		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	<u>Planning</u> Can they use different ideas and suggest how to find something out? Can they make and record a prediction before testing? Can they plan a fair test and explain why it was fair? Can they set up a simple fair test to make comparisons? Can they explain why they need to collect information to answer a question? Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables? <u>Obtaining and presenting evidence</u> Can they measure using different units of measure and equipment, e.g. thermometers or data loggers? Can they record their observations in different ways? (Labelled diagrams and charts etc…) Can they describe what they have found using scientific language? Can they make accurate measurements using standard units?	The working scientifically objectives will be covered throughout this unit.

	Can they explain their findings in different ways (display, presentation, writing)? Can they use their findings to draw a simple conclusion? Can they suggest improvements and predictions for further tests? <u>Considering evidence and evaluating</u> Can they explain what they have found out and use their measurements to say whether it helps to answer their question? Can they use a range of equipment (including a data-logger) in a simple test? Can they suggest how to improve their work if they did it again? Can they identify differences, similarities or changes related to simple scientific ideas and processes.	
Scientific Knowledge	Can they identify that animals, including humans, cannot make their own food: they get nutrition from what they eat?	**<u>Elicitation</u>** Children to draw and label on an outline of a human body any areas they know are to do with eating. Discuss the term 'diet'. What does it actually mean? Discuss children's favourite meals/foods/drinks. Do they think they are healthy? Why?/Why not? Draw whole class concept map about DIET on whiteboard using children's ideas. Children to suggest links between ideas. Children to draw and label their favourite meal. **<u>Food Groups</u>** Use concepts of Food Pyramid and Balanced Plate to introduce the idea of food groups. Discuss the foods

		children can see in each group and make links between them. Explain simply main function of each group. Children to sort real bags of shopping into different food groups and verbally explain choices. Using blank pyramids, children to draw a variety of appropriate foods in each section. ICT – use IWB programs to encourage children to begin sorting foods into different groups. English – new vocabulary to learn (carbohydrate, vitamins & minerals, protein, dairy, fats & sugars).
	Can they explain the importance of a nutritionally balanced diet?	**Balanced Diet** Present children with pictures of a wide variety of foods, including individual foods, combinations of foods or whole meals. Children to discuss with partner what foods they can see and which group(s) they belong to, then choose several different combinations that would provide a balanced meal. Use own food pyramids from previous lesson. Art - Use paper templates to draw and colour their balanced meal. Speaking - Explain choices to the class.
	Challenge Can they explain how certain living things depend on one another to survive?	Discuss with children which foods are from plants and which from animals. Explain that plants can make their own food but animals need to get their food from plants or other animals and therefore depend on them for their survival. Discuss the effect, for example, of a crop failure on animals and humans in different parts of the world. **Food Miles** Investigate food labels to find foods that come from

	<u>Challenge</u> Can they explain how people, weather and the environment can affect living things? (To develop an understanding of where our food comes from. To understand the concept of 'Food Miles'. To discuss how this can affect the environment. Develop understanding of the wider world, including some economic activities.) Can they design and make a healthy sandwich based on their knowledge of a balanced meal? Can they describe how nutrients, water and oxygen are transported within animals, including humans?	different countries. Record type of food and country of origin. Show on world map (Google Earth). Use a pizza with a variety of toppings to find out the total distance travelled by the different foods. Class discussion on the pros and cons of 'Food Miles'. Geography – Use world maps and globes to locate the country of origin of each food. Discuss why people might buy food from other countries, and how the food got from, e.g. Egypt to ASDA in Shaw! Maths - Analyse the total distance travelled by each item in the pizza (food miles). Geography - What impact might this have on the environment? Speaking & Listening - Children to put forward their own views on the pros and cons. <u>See DT unit of work: Cooking and Nutrition</u> **<u>Transport</u>** Using diagrams and video clips show ch how food is broken down into smaller bits in our mouth, stomach and intestine. These small nutrients are absorbed into the blood stream (circulatory system), which acts like a transport to deliver nutrients to all parts of the body. Compare with the circulatory systems of other animals. Use drama to act out the process of pieces of food being broken down, first in the mouth, then in the stomach, then in the small intestine. English – new subject specific vocabulary Frequent quick-fire questions with rewards to encourage familiarity with,

		and correct use of, these words. ICT – Use interactive programs, e.g. Crickweb, Primary Resources.
	Can they describe and explain the skeletal system of a human?	**Skeletons - Functions** Discuss the main functions of skeletons: support, protection and movement. Cut out life size paper pupil, hold it and let it fall to the ground to show what we would be like without a skeleton. Work together to find out how skeletons protect different parts of the body. Find out that muscles are also needed for movement. Children feel their own bones and label a skeleton. Talk about broken bones and look at some x-rays. ICT – Children to use Interactive program to help them label each part of the skeleton, and put a skeleton back together again. English – learn and use new subject specific vocabulary. Music - Begin to learn Skeleton Song. Art – Make pasta skeletons.
	Challenge Can they classify living things and non-living things by a number of characteristics that they have thought of?	**Compare Skeletons** Discover, using ICT clips, that not all animals have skeletons inside their bodies; some have exoskeletons. Compare them with endoskeletons like humans have. Examine some sterilised bones closely and identify some properties. Ch to make detailed drawings of bones and annotate them. Link to fossils. Compare other skeletons with that of a human. Ch learn that mammal skeletons are adapted to suit their lives, and develop over time, by using computer programs to build mammal skeletons.

	Can they describe and explain the muscular system of a human? <u>Challenge</u> Can they explain how the muscular and skeletal systems work together to create movement? Can they identify that humans and some other animals have skeletons and muscles for support, protection and movement?	ICT – for research and interactive activities. English – learn and use new subject specific vocabulary. Label diagrams. Art – observational drawings. **<u>Muscles</u>** Children look at joints in the human body and the movements that each allow before looking at how muscles control every move we make. Investigate the range of movements at different points around their bodies. Look closely at the movement of their arm to understand how the biceps and triceps work together. Models are constructed to show how pairs of antagonistic muscles pull to work together. **<u>Effect of exercise</u>** A PE lesson with a Scientific twist. Ch feel, measure and record the effects of exercise on their own bodies at 5 stages in the lesson: Before, Warming up, Light exercise, Heavy exercise, Cooling down. Use ICT (Children's University of Manchester) to investigate the benefits of keeping fit and the effects of over exercise such as cramps or a stitch. Maths – Count pulse rate for 15 seconds, then x4 for heart rate. ICT – for further information on how exercise affects the body.

Additional Guidance	Notes and guidance (non-statutory) Pupils should continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions. Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy and design meals based on what they find out.	

Science Scheme of Work

Year 3 – Forces and Magnets (Autumn)		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically	<u>Planning</u> Can they use different ideas and suggest how to find something out? Can they make and record a prediction before testing? Can they plan a fair test and explain why it was fair? Can they set up a simple fair test to make comparisons? Can they explain why they need to collect information to answer a question? Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables? <u>Obtaining and presenting evidence</u> Can they measure using different units of measure and equipment, e.g. thermometers or data loggers? Can they record their observations in different ways? (Labelled diagrams and charts etc…) Can they describe what they have found using scientific language? Can they make accurate measurements using standard units? Can they explain their findings in different ways (display, presentation, writing)? Can they use their findings to draw a simple conclusion?	The 'Working Scientifically' objectives will be carried out throughout the unit. ***<u>Overview</u>*** This unit gives children experience of forces, including attraction and repulsion between magnets, compression and stretching of springs and stretching of elastic bands. They learn that these forces have direction and can vary in size. They also learn which materials are attracted to magnets. Experimental and investigative work focuses on: • making simple predictions • planning what evidence to collect • interpreting evidence and using it to draw conclusions. Work in this unit also offers many opportunities to relate science to everyday things *eg magnets for toys and household appliances*, and to discuss sorting materials for recycling. Work will involve whole class, paired, group and individual tasks with lots of opportunities to

	Can they suggest improvements and predictions for further tests? <u>Considering evidence and evaluating</u> Can they explain what they have found out and use their measurements to say whether it helps to answer their question? Can they use a range of equipment (including a data-logger) in a simple test? Can they suggest how to improve their work if they did it again? Can they identify differences, similarities or changes related to simple scientific ideas and processes.	develop Speaking and Listening skills. Cross-curricular links: English, Maths, ICT.
Scientific knowledge	Can they observe that magnetic forces can be transmitted without direct contact? Can they notice that some forces need contact between two objects, but magnetic forces can act at a distance? Can they observe how some magnets attract or repel each other? Can they describe magnets having two poles (N & S)? Can they predict whether two magnets will attract or repel	**<u>Elicit ch's existing understanding of forces and movement.</u>** Review children's understanding of forces and movement *eg by asking them to recognise and label pushes/pulls in pictures or around the classroom* and talking about their ideas. Show ch Powerpoint: Introduction to Magnets. **<u>Explore Magnets</u>** Give children a variety of magnets *eg wand, bar, horseshoe, ceramic, circular* to handle and explore. Using magnets with clearly labelled ends, ask children to investigate and record what happens when they are put together. Show ch Programme 10.3 from BBC Science Clips DVD (Properties of Magnets).

	each other depending on which poles are facing? Can they classify which materials are attracted to magnets and which are not? Can they compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet? Can they identify some magnetic materials? Can they investigate the strengths of different magnets and find fair ways to compare them?	Do their investigations show the same thing? Record their findings in writing and diagrams. **Make and test predictions about magnets** Present children with a collection of materials, including materials found in and around the classroom, and ask them to suggest which are magnetic and how they can find out whether they are right. When children consider their results, they should be asked to group the materials into magnetic and non-magnetic and to make a relevant generalisation. **Uses of magnets** Ask children to use secondary sources *eg reference books, CD-ROMs* to find out about everyday uses of magnets *eg in recycling materials, in the home.* Watch Magnets in Recycling(Programme 10.4) from BBC Science Clips DVD. **Investigation** Present children with several magnets and ask them to find out whether they are all equally strong. Ask children to suggest how they will decide which magnet is strongest *eg by seeing how many paper clips a magnet can hold in a chain or by finding out how close a paper clip has to be to a*

		magnet and help them to carry out an investigation. OR Present children with a magnet and a variety of materials *eg card, fabric, aluminium foil, thin wood, water, iron* and ask them to find out whether magnets work through these materials. Help them to decide what they will do and help them to carry out an investigation. Ask children to tell others about what their investigation showed. **Assessment** 1. Self-assessment: Ch to use BBC Science Clips on computers to revise work done in this unit. Carry out a range of virtual experiments. Take the multiple choice quiz at the end. Revisit clips as necessary and repeat quiz. Print certificate when score is 10/10. 2. Ch to take Rising Stars 'Achieve' test on this unit.
Additional guidance	Notes and guidance (non-statutory) Pupils should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe). Pupils might work scientifically by: comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on	

	different surfaces and gathering and recording data to find answers their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets.	

Science Scheme of Work

Year 3- Plants (Spring)		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically	<u>Planning</u> Can they use different ideas and suggest how to find something out? Can they make and record a prediction before testing? Can they plan a fair test and explain why it was fair? Can they set up a simple fair test to make comparisons? Can they explain why they need to collect information to answer a question? Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables? <u>Obtaining and presenting evidence</u> Can they measure using different units of measure and equipment, e.g. thermometers or data loggers? Can they record their observations in different ways? (Labelled diagrams and charts etc…) Can they describe what they have found using scientific language? Can they make accurate measurements using standard units? Can they explain their findings in different ways (display, presentation, writing)? Can they use their findings to draw a simple conclusion?	These objectives will be covered throughout the unit. **<u>Overview</u>** Children will find out about what plants need to grow well and why it is important that they do. They will learn the functions of plant parts and the life cycle of flowering plants. They will investigate the importance of water, light and warmth to plants, considering what evidence should be collected, how good the evidence is, making careful measurements and using results to draw conclusions. The topic will include whole class, group and individual work together with independent research. Real plants and seeds (including those from the school grounds) together with computer simulations and microscopes will be used for investigations and practical activities. Artwork will focus on observational drawings and the study of plant textures. **<u>Enjoyment Fun/Practical /First Hand</u>** Real flowering plants will be used to investigate plant parts and carry out a range of investigations. Children will use a computer microscope to study

	Can they suggest improvements and predictions for further tests? <u>Considering evidence and evaluating</u> Can they explain what they have found out and use their measurements to say whether it helps to answer their question? Can they use a range of equipment (including a data-logger) in a simple test? Can they suggest how to improve their work if they did it again? Can they identify differences, similarities or changes related to simple scientific ideas and processes.	seeds, leaves, petals etc… in detail. Each child will plant and grow a seed (bean or sunflower), keeping a record of its growth. Children will use a range of ICT – simulations, DVDs, CD-ROMs, interactive whiteboard activities, cameras for research and investigations. Children will visit the school pond area as part of their scientific investigations, and for stimulation for artwork.
Scientific knowledge	Can they identify and describe the functions of different parts of flowering plants (roots, stem/trunk, leaves and flowers)? Can they explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal?	**<u>Identify parts of a flowering plant and their functions.</u>** Show a series of pictures on IWB,(Espresso) illustrating plants being grown for food. Discuss the importance of plants as food. Give children a diagram of a flowering plant and ask them to label the main parts. Use ICT (www.schooltrain) to research the function of each plant part. Record in sentences on given diagram. Share findings. Explain and encourage children to use scientific vocabulary, e.g. photosynthesis, carbon dioxide, absorb. **<u>Life Cycle of a flowering plant.</u>** Use Big Book 'The Sunflower' to demonstrate the stages from seed germination to seed production.

		Watch a time lapse film of seed germination and growth, and a powerpoint showing the process of pollination. Children to arrange pictures of the nasturtium life cycle into correct order. Children to follow instructions on the seed packet to plant their own bean seed. Over next few days, record observations as the seed grows in pictures and words (Bean Plant Diary).
	Can they investigate the way in which water is transported within plants?	**Transportation of water.** Show children a complete head of celery and ask them to look closely at the stem. Cut a stem across and observe the cut end, using computer microscope. Put the celery stems in water coloured with red food colouring. Children to make drawings to show what they observe and explain in writing what they think has happened.
	Can they explore the requirement of plants for life and growth (air, light, water, nutrients from the soil, and room to grow)? Can they explain how they vary from plant to plant?	**To investigate how much water, light and heat plants need to grow well:** Children to work in groups to carry out one of the following investigations, then report findings back to the other groups: **Water** Ask children to suggest how they could use plants to find out the most appropriate amount of water. Help the ch. to decide what evidence to collect, e.g. how many plants to use, how much water to give them and what to measure. **Light** Ask children how they could use plants to find out

	<u>Challenge</u> Can they classify a range of common plants according to many criteria (environment found, size, climate required, etc…)?	the most appropriate level of light. Help ch. to decide what evidence to collect, e.g. how many plants to use, where to put the plants, how long for and what to record. **<u>Heat</u>** Ask children how they could use plants to find out the most appropriate temperature for healthy plant growth. Help ch. to decide what evidence to collect, e.g. how many plants to use, where to put the plants, how long for and what evidence to collect.
Additional guidance	Notes and guidance (non-statutory) Pupils should be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction. Note: Pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens. Pupils might work scientifically by: comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the	

	structure of fruits that relate to how the seeds are dispersed. They might observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.	

Science Scheme of Work

Year 3 – Rocks (Summer)		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically	<u>Planning</u> Can they use different ideas and suggest how to find something out? Can they make and record a prediction before testing? Can they plan a fair test and explain why it was fair? Can they set up a simple fair test to make comparisons? Can they explain why they need to collect information to answer a question? Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables? <u>Obtaining and presenting evidence</u> Can they measure using different units of measure and equipment, e.g. thermometers or data loggers? Can they record their observations in different ways? (Labelled diagrams and charts etc…) Can they describe what they have found using scientific language? Can they make accurate measurements using standard units? Can they explain their findings in different ways (display, presentation, writing)? Can they use their findings to draw a simple conclusion? Can they suggest improvements and predictions for	The 'Working Scientifically' objectives will be carried out throughout the unit. **<u>Overview</u>** Through this unit children should come to recognise that underneath all surfaces is rock which they may not be able to see, that rocks get broken down into pebbles and soils which we can often see, and that there are different sorts of rock with different characteristics. Pebbles and soils from different rocks consequently have different characteristics. Experimental and investigative work focuses on: • considering whether a test is fair • measuring volumes of liquids using appropriate apparatus • making comparisons • drawing and suggesting explanations for conclusions. Work in this unit also offers opportunities for children to use their understanding of science to explain observations about rocks and soils, for children to collect evidence to test ideas, and to recognise hazards and risks. **Cross-curricular links:** Geography (quarrying on Crompton Moor), History (Roman roads and

	further tests? <u>Considering evidence and evaluating</u> Can they explain what they have found out and use their measurements to say whether it helps to answer their question? Can they use a range of equipment (including a data-logger) in a simple test? Can they suggest how to improve their work if they did it again? Can they identify differences, similarities or changes related to simple scientific ideas and processes.	buildings), Maths (capacity, time), ICT (virtual experiments; virtual quarry), English (Scientific reports, subject specific vocabulary).
Scientific knowledge	Can they describe and explain how different rocks can be useful to us? Can they compare and group together different rocks on the basis of their appearance and simple physical properties?	**<u>Know that rocks are used for a variety of purposes.</u>** Elicit ch's existing knowledge and understanding about rocks – create a class concept map. Explain that rocks are naturally occurring and that many other building materials *e.g. bricks* are not. In pairs, survey the school grounds and some other parts of the school building to discover where rocks are used. Distinguish between natural rock and man-made building materials. Can ch name any of the rocks they find? **<u>Know that rocks can be grouped according to observable characteristics;</u>** **<u>to observe and compare rocks</u>** Present groups of children with a collection of rocks to observe and group in terms of texture

	Can they describe and explain the differences between sedimentary and igneous rocks, considering the way they are formed? <u>Challenge</u> Can they classify igneous and sedimentary rocks? Can they describe in simple terms how fossils are formed when things that have lived are trapped within rock?	*e.g. size, shape and arrangement of particles* and appearance *e.g. range of colours.* Ask children to choose a criterion for grouping and ask other children to guess what this is. Complete recording sheet 'A close look at rocks'. Allow each group time to use the computer microscope to observe particles from each type of rock. **<u>Understand that that differences between rocks can be identified by testing</u>** Explain in simple terms how sedimentary and igneous rocks are formed. Allow ch to investigate a range of fossils. Explain how fossils are formed. Can they describe them? Can they work out what sort of creature they were? In mixed ability pairs ch carry out a series of tests on different rocks: a) Compare rocks in terms of how easily they are worn away. Help children to carry out a 'rubbing' test using sandpaper to compare how well different rocks withstand being ground down, and record results. b) Help children test for differences in permeability by dropping small quantities of water on to rocks using a pipette and observing whether it remains on the

	Can they begin to relate the properties of rocks with their uses?	surface or not. c) Compare rocks in terms of whether they can be 'snapped' or not. d) Can they be scratched with a nail? Ch to choose 4 different rocks from: sandstone, limestone, granite, chalk, slate, clay, marble and basalt, and carry out all the tests on each one. Record results on a chart. Help ch to decide what to keep the same and what to measure each time in order to keep the tests fair. Share and compare results with the class: Ask ch to rank their rocks in terms of hardness, permeability etc... Do all groups agree? Begin to think about which rocks would/would not be suitable for particular purposes, *e.g. slate does not absorb water so it would be suitable for a roof; chalk is crumbly and absorbs water so it would not be suitable for house building.* **<u>Know that rocks are chosen for particular purposes because of their characteristics</u>** Children review, using secondary sources *e.g. books, CD-ROMs, BBC Science Clips,* the uses of different rocks and link these to their characteristics. Draw and label a simple scene from Ancient Rome,

		showing how different types of rock were used for e.g. a temple, columns, steps, road, statue etc… Write sentences below explaining how the use of the rock is linked to its characteristics.
	Can they recognize that soils are made from rocks and organic matter?	**<u>Know that beneath all surfaces there is rock; that there are different kinds of soil depending on the rock from which they come</u>** Show a series of pictures *e.g. cliffs, quarries, mountains with rock faces, fields/moors with rocky outcrops, muddy fields, town streets* and ask children to point out where the rocks are. Ask them to suggest why they can see rocks in some pictures but not in others. Show a video or a series of pictures showing different soils. Ask children to compare these with a sample of soil from the local environment. Discuss what soil is and why it is different in different areas. Ch to draw a labelled diagram showing a cliff, soil layers and bedrock. **<u>to observe differences and make comparisons that particles of different sizes can be separated by sieving</u>** Present groups of children with 4 samples of different soils and ask them to observe and record differences in colour, texture and what

		makes up the soil. Suggest children use a sieve with large mesh to separate out large particles. Use graded sieves to separate the dry soil sample. Ask children to describe and explain what they found out about the soils. Ch to rank soils in terms of particle size and colour (darkest to lightest). Can ch describe how the soil particles were separated? **To plan a fair test;** **to make and record measurements of time and volume of water;** **to use their results to make comparisons, and draw and explain conclusions** Investigate the relationship between type of soil and ease of water flow through it. Remind ch of earlier work on the characteristics of different soils. Help them to plan what to measure and what apparatus to use *e.g. how much water flows through in a given time or how long it takes the same volume of water to flow through different soils* and to plan a fair test and remind them about how to measure volumes of water. If necessary, provide children with a prepared table. Discuss results with them and ask them to explain the differences and what this shows about the different soils. Can the children: explain how the test is fair *e.g. by saying they will use the same volume (amount) of soil, the same*

		volume of water and measure how long the water takes to flow through; make careful measurements of time and volume; explain the results *e.g. by saying that the water went through the sandy soil most quickly because there were bigger spaces which let the water through*
Additional guidance	Notes and guidance (non-statutory) Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed.	

Science Scheme of Work

Year 3 - Light (Summer)		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working scientifically	<u>Planning</u> Can they use different ideas and suggest how to find something out? Can they make and record a prediction before testing? Can they plan a fair test and explain why it was fair? Can they set up a simple fair test to make comparisons? Can they explain why they need to collect information to answer a question? Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables? <u>Obtaining and presenting evidence</u> Can they measure using different units of measure and equipment, e.g. thermometers or data loggers? Can they record their observations in different ways? (Labelled diagrams and charts etc…) Can they describe what they have found using scientific language? Can they make accurate measurements using standard units? Can they explain their findings in different ways	The 'Working Scientifically' objectives will be carried out throughout the unit. ***<u>Overview</u>*** This unit introduces the relationship between light, an object and the formation of shadows. Children observe the apparent movement of the Sun and the associated changes in shadows. Experimental and investigative work focuses on: • making and recording measurements and observations • drawing conclusions • suggesting explanations for observations and conclusions. Work in this unit also offers children opportunities to explain shadows using scientific knowledge and to recognise the hazards and risks in looking at the Sun. **Cross-curricular links:** ICT, Maths, Geography, History.

	(display, presentation, writing)? Can they use their findings to draw a simple conclusion? Can they suggest improvements and predictions for further tests? <u>Considering evidence and evaluating</u> Can they explain what they have found out and use their measurements to say whether it helps to answer their question? Can they use a range of equipment (including a data-logger) in a simple test? Can they suggest how to improve their work if they did it again? Can they identify differences, similarities or changes related to simple scientific ideas and processes.	
Scientific knowledge	Can they recognise that they need light in order to see things? Can they recognise that dark is the absence of light? Can they notice that light is reflected from surfaces? Can they recognise that light from the sun can be dangerous and that there are ways to protect their eyes? Can they recognise that shadows are formed when	**<u>Review existing understanding of light and dark.</u>** Whole class activity – draw a concept map linking ch's ideas about light, using terms, e.g. light, dark, night, day, light source, seeing, shiny, Sun, Earth, sunshine, lighting up. Individual elicitation activity – give ch a simple picture of a person sitting near a window looking at an object in the room. Ask ch to draw lines on the picture with arrows to show where the light comes from and how light allows the person to see the object. **<u>To know that shadows are formed when light travelling</u>**

	the light from a light source is blocked by a solid object? Can they find patterns in the way that the size of shadows change? <u>Challenge</u> Can they explain why lights need to be bright or dimmer according to need? Can they explain why their shadow changes when the light source is moved closer or further from the object?	**<u>from a source is blocked. To make and record observations and to present information in drawing and writing.</u>** Let ch explore shadow formation using torches and other light sources, e.g. OHP/IWB. Use objects of different shapes and different materials. Introduce ch to the idea of light travelling from a source by shining a powerful torch beam through a comb with widely spaced teeth or a cardboard tube and showing that the beam is blocked and doesn't bend round corners. Show that a shadow is formed on a screen. Ask ch to record what they see in drawings and writing. **<u>To know that shadows are formed when objects block light from the Sun. That shadows are similar in shape to the objects forming them. That shadows of objects in sunlight change over the course of the day. To make and record observations of shadows and to try to explain these using knowledge about light.</u>** On a bright sunny day visit the school grounds to observe shadows, possibly including those formed by clouds. Suggest ch explore shadows of themselves in different positions, e.g. *standing, crouched down, with arms extended.* Record some shadows (not of clouds) with chalk on the tarmac. Later in the day look to see if the shadows are in the same place and are the same size and shape. Talk about the shadows with the ch and ask them to make drawings to show their observations and to describe what these show. Encourage ch to try to explain how the shadows were formed.

		That shadows change in length and position throughout the day. To measure the length of the shadow in standard measures. To make a table and bar chart to show how the length of the shadows changes during the day. At different times during a bright sunny day visit the playground and set up a stick. Ask ch to measure and record the length of the shadow at different times of the day, e.g. 9am, 12 noon, 3pm. Ask ch to predict, e.g. *by drawing on the ground* the height of the shadow at intermediate times. Help ch to present their results in a table and to make a bar chart showing the length of the shadow at different times of the day. **To identify a pattern in the observations of the Sun. That the Sun appears to move across the sky during the day. That the Sun appears highest in the sky at midday. That the higher the Sun appears in the sky, the shorter the shadow. That the Sun does not move, its apparent movement is caused by the spinning of the earth on its axis.** Show ch a computer simulation of their previous stick experiment. Discuss how the shadow changes in relation to the apparent movement of the Sun. Illustrate, using a flag attached to a globe and a powerful torch to represent the Sun, that the shadows change as the Earth rotates and the Sun stays still. Ch to explain their understanding in a series of illustrated statements.

	Can they explain the difference between transparent, transluscent and opaque?	**That shadows can be used to tell the approximate time of day.** Use secondary sources e.g. reference books, CD-ROMS, Internet, to investigate how sundials were used and constructed. Make own cardboard sundial, decorated according to research findings. What were the limitations of sundials? **To know that opaque objects/materials do not let light through and transparent objects/materials let a lot of light through. To use their knowledge about light and shadows to predict which materials will form a shadow and to plan how to test this. To compare the shadows formed by different materials and to draw conclusions from their results. To decide whether the results support their predictions and to use knowledge about shadow formation to explain the conclusions.** Remind ch of earlier investigations of shadow formation. Present ch with a collection of materials, including some that are opaque, transparent and translucent, e.g. coloured card, greaseproof paper, tissue paper, newspaper, laminating pouch, sandwich bag, acetate (including coloured), tin foil. Demonstrate how to make a simple lantern, cutting different shapes out of black card. Ask ch to cover the holes with one opaque material, one transparent material, one translucent material and one reflective material. Predict what will happen when the lantern is held up to a light source. Test their predictions and record their

		results. Write a report of their experiment.
Additional guidance	Notes and guidance (non-statutory) Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves. They should think about why it is important to protect their eyes from bright lights. They should look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change. Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.	

Science Scheme of Work

Year 4 – Animals, including humans		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	Planning- • Can they set up a simple fair test to make comparisons? • Can they plan a fair test and isolate variables, explaining why it was fair and which variables have been isolated? • Can they suggest improvements and predictions? • Can they decide which information needs to be collected and decide which is the best way for collecting it? • Can they use their findings to draw a simple conclusion? ❖ Can they plan and carry out an investigation by controlling variables fairly and accurately? ❖ Can they use test results to make further predictions and set up further comparative tests? Obtaining and Presenting Evidence- • Can they take measurements using different equipment and units of measure and record what they have found in a range of ways? • Can they make accurate measurements using	Tooth decay investigation using eggs and liquids containing different amounts of sugar.

	standard units? • Can they explain their findings in different ways (display, presentation, writing? ❖ Can they record more complex data and results using scientific diagrams, classification keys, ❖ Tables, bar charts, line graphs and models? Considering evidence and evaluating- • Can they find any patterns in their evidence or measurements? • Can they make a prediction based on something they have found out? • Can they evaluate what they have found out using scientific language, drawings, labelled diagrams, bar charts and tables? • Can they use straightforward scientific evidence to answer questions or to support their findings? • Can they identify differences, similarities or changes related to simple scientific ideas or processes? ❖ Can they report findings from investigations through written explanations and conclusions? ❖ Can they use a graph or diagram to answer scientific questions?	
Animals, including humans	Can they identify and name the basic parts of the digestive system in humans? Can they describe the simple functions of the basic parts	Watch the episode of The Magic School-Bus called 'For Lunch' available on Youtube where the bus is shrunk and swallowed by a child. The show

	of the digestive system in humans? Can they identify the simple function of different teeth in humans? Can they compare the teeth of carnivores and herbivores? Can they explain what a simple food chain shows? Can they construct and interpret what a variety of food chains show? • Can they construct and interpret a variety of food chains, identifying producers, predators and prey • Can they classify living and non-living things by a number of characteristics that they have thought of? • Can they explain how people, weather and the environment can affect living things? • Can they explain how certain living things depend on one another to survive?	then follows the bus through the child's digestive system and explains the basic functions of each part. Label a powerpoint with the parts and functions. Children research in more detail on ipads and produce a booklet with their findings. Introduce foodchains, show the children some examples and then allow them to come up with one simple one (that they already know) of their own. Now allow children to research their own food chains and draw them in their books. Discuss the difference between living and non-living things. What characteristics can the children think of to help distinguish between the two states? Sort animals/plants/non-living into these characteristics. Introduce the children to MRS GREN. Can they sort their objects/organisms according to these criteria now? Ask children

Science Scheme of Work

Science Scheme of Work

Year 4 – States of matter		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	Planning- • Can they set up a simple fair test to make comparisons? • Can they plan a fair test and isolate variables, explaining why it was fair and which variables have been isolated? • Can they suggest improvements and predictions? • Can they decide which information needs to be collected and decide which is the best way for collecting it? • Can they use their findings to draw a simple conclusion? ❖ Can they plan and carry out an investigation by controlling variables fairly and accurately? ❖ Can they use test results to make further predictions and set up further comparative tests? Obtaining and Presenting Evidence- • Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?	Investigate what happens when materials are heated or cooled (in your hand) Plan how you will test what happens What are your predictions What conclusions can you draw from the experiment?

	• Can they make accurate measurements using standard units? • Can they explain their findings in different ways (display, presentation, writing? ❖ Can they record more complex data and results using scientific diagrams, classification keys, ❖ Tables, bar charts, line graphs and models? Considering evidence and evaluating- • Can they find any patterns in their evidence or measurements? • Can they make a prediction based on something they have found out? • Can they evaluate what they have found out using scientific language, drawings, labelled diagrams, bar charts and tables? • Can they use straightforward scientific evidence to answer questions or to support their findings? • Can they identify differences, similarities or changes related to simple scientific ideas or processes? ❖ Can they report findings from investigations through written explanations and conclusions? ❖ Can they use a graph or diagram to answer scientific questions?	
States of Matter	Can they compare and group materials together, according to whether they are solids, liquids or gases?	Look at some pictures of Solids liquids and gases, can the children sort them according to what state

	Can they explain what happens to materials when they are heated or cooled? Can they measure or research the temperature at which different materials change state in degrees Celsius? Can they use measurements to explain changes to the state of water? Can they identify the part that evaporation and condensation has in the water cycle? Can they associate the rate of evaporation with temperature? • Can they group and classify a variety of materials according to the impact of temperature on them? • Can they explain what happens over time to materials such as puddles on the playground or washing hanging on a line? • Can they relate temperature to change of state of materials?	they are in? What is the difference between the states? Give children some samples of solids and liquids and discuss gasses. What are the properties of each state of matter? Fill in the sheet appropriately with a mini diagram of the molecular structure of each. Show the children a gas by boiling a kettle Well away from the children themselves. That's gas! What other gases can they think of? How did the water become gas? Find out about the boiling, freezing and melting points of certain materials. What happens when I put water into a freezer? Predict what you think will happen when a selection of materials are heated or cooled. Find out some of them using the internet, save the others for the investigation that we are going to do

		carry out the balloon, vinegar and bicarb investigation to prove that gas is being made.

Science Scheme of Work

Year 4- Sound		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	Planning- • Can they set up a simple fair test to make comparisons? • Can they plan a fair test and isolate variables, explaining why it was fair and which variables have been isolated? • Can they suggest improvements and predictions? • Can they decide which information needs to be collected and decide which is the best way for collecting it? • Can they use their findings to draw a simple conclusion? ❖ Can they plan and carry out an investigation by controlling variables fairly and accurately? ❖ Can they use test results to make further predictions and set up further comparative tests? Obtaining and Presenting Evidence- • Can they take measurements using different equipment and units of measure and record what they have found in a range of ways? • Can they make accurate measurements using	Spring Term: Conduct an investigation to find out which materials make good sound insulators. Plan how you will do it using an iPad alarm as the sound to be insulated. Record the results using arbitrary measures eg 'it was quieter than with the tin foil' What conclusions can you draw from this investigation? Why did some materials work better than others as sound insulators? Not possible to measure using standard measures

	standard units? • Can they explain their findings in different ways (display, presentation, writing? ❖ Can they record more complex data and results using scientific diagrams, classification keys, ❖ Tables, bar charts, line graphs and models? Considering evidence and evaluating- • Can they find any patterns in their evidence or measurements? • Can they make a prediction based on something they have found out? • Can they evaluate what they have found out using scientific language, drawings, labelled diagrams, bar charts and tables? • Can they use straightforward scientific evidence to answer questions or to support their findings? • Can they identify differences, similarities or changes related to simple scientific ideas or processes? ❖ Can they report findings from investigations through written explanations and conclusions? ❖ Can they use a graph or diagram to answer scientific questions?	With support, write a conclusion to your investigation giving reasons for why you think the material that was the best insulator worked so well.
Sound Spring Term	*Can they describe a range of sounds and explain how they are made?* *Can they associate some sounds with something vibrating?*	Discuss what sounds we can hear. Play sound bingo and go on a listening walk around school. Why could we hear nearer things better than further away

	Can they compare sources of sounds and understand how the sounds differ? *Can they explain how to change a sound (louder/softer)?* *Can they recognise how vibrations from sound travel through a medium to an ear?* *Can they find patterns between the pitch of a sound and features of the object that produced it?* *Can they recognise that sounds get fainter as the distance from the source increases?* *Can they explain how you could change the pitch of a sound?* *Can they investigate how different materials can affect the pitch and volume of sounds?* *Can they explain why sound gets fainter or louder according to the distance?* *Can they explain how pitch and volume can be changed in a variety of ways?* *Can they work out which materials give the best insulation for sound?*	things? (They get quieter as they move away from the source) Watch a video which shows how sounds are made when an object vibrates, then demonstrate the principle using a drum Provide children with a selection of musical instruments. Can they make them louder and quieter? Can they show how to make the sounds of each instrument higher or lower? Can they explain what they did? Which instruments sound the lowest? Which have the highest sound? Why do you think that is (discuss that different materials will make different sounds) Conduct an investigation using a variety of materials, into which materials make good sound insulators.

Science Scheme of Work

Year 4 – Living Things, their Habitats and Animals, including humans		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	Planning- • Can they set up a simple fair test to make comparisons? • Can they plan a fair test and isolate variables, explaining why it was fair and which variables have been isolated? • Can they suggest improvements and predictions? • Can they decide which information needs to be collected and decide which is the best way for collecting it? • Can they use their findings to draw a simple conclusion? ❖ Can they plan and carry out an investigation by controlling variables fairly and accurately? ❖ Can they use test results to make further predictions and set up further comparative tests? Obtaining and Presenting Evidence- • Can they take measurements using different equipment and units of measure and record what they have found in a range of ways? • Can they make accurate measurements using	Invertebrate hunt in the school grounds.

	standard units? • Can they explain their findings in different ways (display, presentation, writing? ❖ Can they record more complex data and results using scientific diagrams, classification keys, ❖ Tables, bar charts, line graphs and models? Considering evidence and evaluating- • Can they find any patterns in their evidence or measurements? • Can they make a prediction based on something they have found out? • Can they evaluate what they have found out using scientific language, drawings, labelled diagrams, bar charts and tables? • Can they use straightforward scientific evidence to answer questions or to support their findings? • Can they identify differences, similarities or changes related to simple scientific ideas or processes? ❖ Can they report findings from investigations through written explanations and conclusions? ❖ Can they use a graph or diagram to answer scientific questions?	
Animals, including humans	recognise that living things can be grouped in a variety of ways including the 5 vertebrate groups. Touch on the names of some of the invertebrate groups too.	

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

Science Scheme of Work

Year 4- Electricity		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	Planning- • Can they set up a simple fair test to make comparisons? • Can they plan a fair test and isolate variables, explaining why it was fair and which variables have been isolated? • Can they suggest improvements and predictions? • Can they decide which information needs to be collected and decide which is the best way for collecting it? • Can they use their findings to draw a simple conclusion? ❖ Can they plan and carry out an investigation by controlling variables fairly and accurately? ❖ Can they use test results to make further predictions and set up further comparative tests? Obtaining and Presenting Evidence- • Can they take measurements using different equipment and units of measure and record what they have found in a range of ways? • Can they make accurate measurements using	Spring Term: Conduct an investigation to find out which materials make good sound insulators. Plan how you will do it using an iPad alarm as the sound to be insulated. Record the results using arbitrary measures eg 'it was quieter than with the tin foil' What conclusions can you draw from this investigation? Why did some materials work better than others as sound insulators? Not possible to measure using standard measures

	standard units? • Can they explain their findings in different ways (display, presentation, writing? ❖ Can they record more complex data and results using scientific diagrams, classification keys, ❖ Tables, bar charts, line graphs and models? Considering evidence and evaluating- • Can they find any patterns in their evidence or measurements? • Can they make a prediction based on something they have found out? • Can they evaluate what they have found out using scientific language, drawings, labelled diagrams, bar charts and tables? • Can they use straightforward scientific evidence to answer questions or to support their findings? • Can they identify differences, similarities or changes related to simple scientific ideas or processes? ❖ Can they report findings from investigations through written explanations and conclusions? ❖ Can they use a graph or diagram to answer scientific questions?	With support, write a conclusion to your investigation giving reasons for why you think the material that was the best insulator worked so well.
Sound Spring Term	*Can they describe a range of sounds and explain how they are made?* *Can they associate some sounds with something vibrating?*	Discuss what sounds we can hear. Play sound bingo and go on a listening walk around school. Why could we hear nearer things better than further away

	Can they compare sources of sounds and understand how the sounds differ? *Can they explain how to change a sound (louder/softer)?* *Can they recognise how vibrations from sound travel through a medium to an ear?* *Can they find patterns between the pitch of a sound and features of the object that produced it?* *Can they recognise that sounds get fainter as the distance from the source increases?* *Can they explain how you could change the pitch of a sound?* *Can they investigate how different materials can affect the pitch and volume of sounds?* *Can they explain why sound gets fainter or louder according to the distance?* *Can they explain how pitch and volume can be changed in a variety of ways?* *Can they work out which materials give the best insulation for sound?*	things? (They get quieter as they move away from the source) Watch a video which shows how sounds are made when an object vibrates, then demonstrate the principle using a drum Provide children with a selection of musical instruments. Can they make them louder and quieter? Can they show how to make the sounds of each instrument higher or lower? Can they explain what they did? Which instruments sound the lowest? Which have the highest sound? Why do you think that is (discuss that different materials will make different sounds) Conduct an investigation using a variety of materials, into which materials make good sound insulators.
Electricity Summer Term	*Can they identify common appliances that run on electricity?* *Can they construct a simple series electric circuit?* *Can they 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?* *Can they recognise that a switch opens and closes a circuit?* *Can they associate a switch opening with whether or not a lamp lights in a simple series circuits?* *Can they recognise some common conductors and insulators?*	Summer Term. 1. Talk about what we already know about Electricity and how it is used. 1 & 2 taught as one lesson. Introduce the topic of electricity and allow children to discuss in pairs what they already know about Electricity from studying it in previous years or through using it at home. What is it for? How can it be used?

	Can they associate metals with being good conductors? • *Can they explain how a bulb might get lighter?* • *Can they recognise if all metals are conductors of electricity?* • *Can they work out which metals can be used to connect across a gap in a circuit?* • *Can they explain why cautions are necessary for working safely with electricity?*	Write some ideas on post-it notes and stick onto a flipchart before sharing as a class. Can the children make a bulb light up? Provide them with the materials they need to create a working circuit – Draw the circuit in books and label the components. Bulb, battery, wire, crocodile clips. Discuss how the circuits worked. What needs to happen in order for the bulb to light up? 2. To recognise whether a circuit will work or not. Recap what we learnt in the previous session about what needs to happen in order for a circuit to work. The children have a selection of diagrams in front of them – Predict whether the circuit in the diagram will work or not. Once the children have predicted the outcome they can test them and then record the results Must – Know that an incomplete circuit will not work.

		Should – Know that it matters which way round you put the batteries. Could – know why it matters which way round you put the batteries. 3. Understand how a simple switch can be used in a circuit. 3&4 taught as 1 ½ lessons with investigation planning one day and then the actual investigation the next. Discuss how to turn an appliance on or off. What does a switch actually do? Why do we need switches? Show the children a paper clip and challenge them to make a circuit with a switch made out of the paperclip. How do you use the switch to light up the bulb? Draw the circuit in science books with the switch in the on position and then in the off position. 4. Know which materials are conductors of electricity and which are insulators. Introduce the idea of electrical conductors and insulators. We are going to find out which materials

		are conductors and which ones are insulators – What question are we investigating? Which materials are conductors of electricity and which are insulators. Sort materials into Venn diagrams according to whether or not they conduct electricity. LA – Children have a venn diagram where they sort materials simply into conductors and insulators. MA/Ha have overlapping 'conductor/non-metal. HA use ipad to find conductors that are non-metal apart from humans and water. 5. Understand that mains electricity is extremely dangerous and how to keep yourself safe from it. http://www.switchedonkids.org.uk/house.html Discuss whether the children already know about any reasons why electricity that comes from a plug might be dangerous. Talk about how the power of electricity is

		measured in volts. Look at a battery. Most are no more than 1 or 2 volts so they are not very dangerous. Overhead power cables operate at up to 400,000v and mains electricity in the home is around 220v which can be extremely dangerous if it is not treated with respect. In pairs look at the hazard sheet and find the hazards. Circle them. And give each one a number. Stick onto a larger piece of paper and then, on post its write down the reasons why each is dangerous. Compile a list of do s and don'ts around electricity as a class on the Flipchart. Design a poster individually to teach younger children about the dangers of electricity. 6. Know how we can change the brightness of a bulb in a circuit. Discuss how we could possibly make a bulb in a circuit shine more brightly. Reference the circuits the children made a few lessons ago and what it was that made them shine more brightly. Plan an investigation using the investigation planner

		sheet (Talk about fair testing) to find out what effect having more batteries has on the brightness of a bulb. Have mixed-ability groups. Carry out the investigation What did we find out? How could we have improved the accuracy of our investigation? If children are having difficulties, check that their batteries are all the correct way around, get them to change each component of the circuit if it still doesn't work until the bulb will light. NOTE some batteries are in double holders – this counts as 2 batteries.

Science Scheme of Work

Year 5 Autumn 1: Properties and changes to materials		
Programme of Study	*Knowledge, Skills and Understanding*	*Activity/ Link to scheme of work*
Working Scientifically (skills)	<u>Planning</u> Can they plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables where necessary? Can they make a prediction with reasons? Can they use test results to make predictions to set up comparative and fair tests? Can they present a report of their findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations? (through writing, display and presentation) ***Challenging*** Can they explore different ways to test an idea, choose the best way and give reasons?	**<u>Compare and group together everyday materials WILF</u>** Choose properties and investigate those properties of different materials. Classify/group the materials Children to share their findings. Which materials are similar? Which materials are very different? **<u>Investigate mixtures and solutions and how to separate them.</u>** Explain what the key vocabulary means; sieving, filtration, dissolving, soluble, insoluble, mixture, solution Create a filter to separate mud from water. Demonstrate Ancient Egyptian methods with a jar of muddy water which has been settling since the start of the session. This process is called decanting.

	Can they vary one factor whilst keeping the others the same in an experiment? Can they use information to help make a prediction? Can they explain, in simple terms, a scientific idea and what evidence supports it? <u>Obtaining and presenting evidence</u> Can they take measurements using a range of scientific equipment with increasing accuracy and precision? Can they take repeat readings when appropriate? Can they record more complex data and results using scientific diagrams, labels, classification keys, tables, scatter graphs, bar graphs and line graphs? ***Challenging*** Can they decide which units of measurements they need to use? Can they explain why a measurement needs to be repeated? <u>Considering evidence and evaluating</u>	**<u>Identify reversible and irreversible changes</u>** Observe experiments carefully. Explain why they are probably irreversible changes. Give other examples of irreversible changes Show Reversible and Irreversible Changes. Could use the following experiments to demonstrate this and how to generally spot an irreversible change: • *Self-inflating balloon* • *Cooking an egg* • *Glowsticks* Recap on the 4 ways that you can typically identify an irreversible change. **<u>Decide how materials might be separated</u>** In groups, decide how to separate the ingredients and in which order you will do it. Explain that they must photograph each stage as they go. Share their work. **<u>Explain a scientific process</u>** Explain each step carefully and present in a neat step by step guide.

	Can they report and present findings from enquiries through written explanations and conclusions? Can they use a graph to answer scientific questions? Can they identify scientific evidence that has been used to support or refute ideas or arguments? ***Challenging*** Can they find a pattern from their data and explain what it shows? Can they link what they have found out to other science? Can they suggest how to improve their work and say why they think this?	**<u>Plan a fair test</u>**. Choose some materials. Hypothesise. Plan an experiment to see what material would be best for keeping mountaineers warm whilst climbing some of the world's highest summits. Write to an outdoor clothing company to give their results. Discuss fair testing – what does it mean? How will we ensure our test is fair? **<u>Evaluate scientific findings</u>** Write letter to company. Explain results and findings. ***In an ideal situation letters will really be sent off to an outdoor company such as Tresspass or The North Face.
Scientific knowledge and understanding	Can they compare and group together everyday materials on the basis of their properties, including hardness, solubility, transparency, conductivity, (electrical and thermal), and response to magnets? Can they explain how some materials dissolve in liquid to form a solution? Can they describe how to recover a substance from a solution?	**<u>Recognize solids, liquids and gases.</u>** Discuss the characteristics of solids, liquids and gases. Write definitions and sort materials. **<u>Understand the process of evaporation</u>** Describe the evaporation in examples using key topic words

	Can they use their knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating? Can they give reasons, based on evidence for comparative and fair tests for the particular uses of everyday materials, including metals, wood and plastic? Can they describe changes using scientific words? (evaporation, condensation) Can they demonstrate that dissolving, mixing and changes of state are reversible changes? Can they 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? Can they use the terms 'reversible' and 'irreversible'? **Challenging** Can they describe methods for separating mixtures? (filtration, distillation) Can they work out which materials are most effective for keeping us warm or for keeping something cold?	**Research the work of famous scientists** Use sources of information to complete fact files on sheet. **Compare and group together everyday materials WILF** Choose properties and investigate those properties of different materials. Classify/group the materials Children to share their findings. Which materials are similar? Which materials are very different? **Investigate mixtures and solutions and how to separate them.** Explain what the key vocabulary means; sieving, filtration, dissolving, soluble, insoluble, mixture, solution Create a filter to separate mud from water. Demonstrate Ancient Egyptian methods with a jar of muddy water which has been settling since the start of the session. This process is called decanting. **Identify reversible and irreversible changes** Observe experiments carefully.

	Can they use their knowledge of materials to suggest ways to classify? (solids, liquids, gases) Can they explore changes that are difficult to reverse, e.g. burning, rusting and reactions such as vinegar and bicarbonate of soda? Can they explore the work of chemists who created new materials, e.g. Spencer Silver (glue on sticky notes) or Ruth Benerito (wrinkle free cotton)?	Explain why they are probably irreversible changes. Give other examples of irreversible changes Show Reversible and Irreversible Changes. Could use the following experiments to demonstrate this and how to generally spot an irreversible change: • *Self-inflating balloon* • *Cooking an egg* • *Glowsticks* Recap on the 4 ways that you can typically identify an irreversible change. **Decide how materials might be separated** In groups, decide how to separate the ingredients and in which order you will do it. Explain that they must photograph each stage as they go. Share their work. **Explain a scientific process** Explain each step carefully and present in a neat step by step guide. **Plan a fair test**. Choose some materials. Hypothesise.

		Plan an experiment to see what material would be best for keeping mountaineers warm whilst climbing some of the world's highest summits. Write to an outdoor clothing company to give their results. Discuss fair testing – what does it mean? How will we ensure our test is fair? **<u>Evaluate scientific findings</u>** Write letter to company. Explain results and findings. ***In an ideal situation letters will really be sent off to an outdoor company such as Tresspass or The North Face.
Additional Guidance	**Notes and guidance (non-statutory)** Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth	

	Benerito, who invented wrinkle-free cotton. **Notes and guidance (non-statutory)** **Note:** Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials. Pupils might work scientifically by: carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.	

Science Scheme of Work

Year 5 Autumn 2: Forces		
Programme of Study	*Knowledge, Skills and Understanding*	*Activity/ Link to scheme of work*
Working Scientifically (skills)	<u>Planning</u> Can they plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables where necessary? Can they make a prediction with reasons? Can they use test results to make predictions to set up comparative and fair tests? Can they present a report of their findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations? (through writing, display and presentation)	<u>Understand upthrust as a force to slow down gravity</u> Use a forcemeter to weigh a series of objects suspended in air and then suspended in water. Ask children to explain what they observe. Use measurements of force using a forcemeter to use tables to present results, identifying patterns and drawing conclusions. <u>Measure elastic bands and weight</u> Make a series of measurements of the length of the elastic band with different weights attached to it. Represent data in a line graph. Identify a trend in the graph *eg the heavier the weight, the more it stretches* and use patterns to make predictions. <u>Investigate air resistance on gyrocopters.</u> Explain air resistance. Cut out gyrocopters and to test small and large gyrocopters. Chn will record results in a table. Chn explain why they think the results occurred using air resistance knowledge. <u>Investigate parachute size and speed of fall.</u> Recap air resistance. Chn will make a small and large parachutes and test surface area. Discuss results

	Challenging Can they explore different ways to test an idea, choose the best way and give reasons? Can they vary one factor whilst keeping the others the same in an experiment? Can they use information to help make a prediction? Can they explain, in simple terms, a scientific idea and what evidence supports it? <u>Obtaining and presenting evidence</u> Can they take measurements using a range of scientific equipment with increasing accuracy and precision? Can they take repeat readings when appropriate? Can they record more complex data and results using scientific diagrams, labels, classification keys,	<u>Conduct an investigation into force independently</u> Provide children with a variety of activities, each with a question or challenge.

	tables, scatter graphs, bar graphs and line graphs? ***Challenging*** Can they decide which units of measurements they need to use? Can they explain why a measurement needs to be repeated? <u>Considering evidence and evaluating</u> Can they report and present findings from enquiries through written explanations and conclusions? Can they use a graph to answer scientific questions? Can they identify scientific evidence that has been used to support or refute ideas or arguments?	

	Challenging Can they find a pattern from their data and explain what it shows? Can they link what they have found out to other science? Can they suggest how to improve their work and say why they think this?	
Scientific knowledge and understanding	Can they explain that unsupported objects fall towards the earth because of the force of gravity acting between the earth and the falling object? Can they identify the effects of air resistance, water resistance and friction that act between moving surfaces? Can they recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect? ***Challenging*** Can they describe and explain how	<u>What is gravity?</u> Discuss. Write a simple explanation on the provided layout & create a diagram to show their understanding of what <u>gravity</u> is *(session resources)*. They should add arrows to show the direction in which this powerful force acts. Measure the force acting on different common classroom objects by hanging them in a fruit bag/plastic bag from a force meter. Ask the children to draw one object being measured complete with arrows and record the force acting on other objects in a simple table (can use *session resource* or draw their own). Compare results, what do they show? What actually is a newton? Who was Isaac Newton (that the unit is named after)? <u>What is gravity and what are Newtons?</u> Comprehension activity: read through together and chn complete differentiated questions on the text. <u>Recognize forces acting on objects.</u>

	motion is affected by forces? (including gravitational attractions, magnetic attraction and friction) Can they design very effective parachutes? Can they work out how water can cause resistance to floating objects? Can they explore how scientists, such as Galileo, Galilei and Isaac Newton helped to develop the theory of gravitation?	Discuss the different forces and ask for examples. Show how the arrows show the direction of force and the strength is shown by the size. Show examples of objects which have clearly identifiable and familiar forces acting on them. Draw diagrams showing the direction of the forces with arrows and to label these. <u>Understand upthrust as a force to slow down gravity</u> Use a forcemeter to weigh a series of objects suspended in air and then suspended in water. Ask children to explain what they observe. Use measurements of force using a forcemeter to use tables to present results, identifying patterns and drawing conclusions. <u>Measure elastic bands and weight</u> Make a series of measurements of the length of the elastic band with different weights attached to it. Represent data in a line graph. Identify a trend in the graph *eg the heavier the weight, the more it stretches* and use patterns to make predictions. <u>Investigate air resistance on gyrocopters.</u> Explain air resistance. Cut out gyrocopters and to test small and large gyrocopters. Chn will record results in a table. Chn explain why they think the results occurred using air resistance knowledge. <u>Investigate parachute size and speed of fall.</u> Recap air resistance. Chn will make a small and large parachutes and test surface area. Discuss results

		<u>Conduct an investigation into force independently</u> Provide children with a variety of activities, each with a question or challenge.
Additional Guidance	**Notes and guidance (non-statutory)** Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down. Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. Pupils might work scientifically	

	by: exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.	

Science Scheme of Work

Year 5 Spring 1: Earth and Space		
Programme of Study	*Knowledge, Skills and Understanding*	*Activity/ Link to scheme of work*
Working Scientifically (skills)	<u>Planning</u> Can they plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables where necessary? Can they make a prediction with reasons? Can they use test results to make predictions to set up comparative and fair tests? Can they present a report of their findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations? (through writing, display and presentation) ***Challenging*** Can they explore different ways to test an idea, choose the best way and give reasons? Can they vary one factor whilst keeping the others the same in an experiment?	**Recognize that the Sun rises in the general direction of the East and sets in the general direction of the West.** **Make observations of where the Sun rises and sets and to recognise the patterns in these.** **Present times of sunrise and sunset in a graph and to recognise trends and patterns in the data.** Use a compass to observe and record, on several days in the winter, the direction of the Sun or of shadows from the Sun throughout the day. Provide children with secondary data about times of sunrise and sunset and help them to present this data as a graph and to identify patterns in the data. Discuss. Complete graphs. Make predictions.

	Can they use information to help make a prediction? Can they explain, in simple terms, a scientific idea and what evidence supports it? <u>Obtaining and presenting evidence</u> Can they take measurements using a range of scientific equipment with increasing accuracy and precision? Can they take repeat readings when appropriate? Can they record more complex data and results using scientific diagrams, labels, classification keys, tables, scatter graphs, bar graphs and line graphs? ***Challenging*** Can they decide which units of measurements they need to use? Can they explain why a measurement needs to be repeated? <u>Considering evidence and evaluating</u> Can they report and present findings from enquiries through written explanations and conclusions?	

	Can they use a graph to answer scientific questions? Can they identify scientific evidence that has been used to support or refute ideas or arguments? ***Challenging*** Can they find a pattern from their data and explain what it shows? Can they link what they have found out to other science? Can they suggest how to improve their work and say why they think this?	
Scientific knowledge and understanding	Can they identify and explain the movement of the earth and other plants relative to the Sun in the solar system? Can they explain how seasons and the associated weather is created? Can they describe and explain the movement of the Moon relative to the Earth? Can they describe the Sun, Earth and Moon as approximately spherical bodies? Can they use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky? ***Challenging*** Can they compare the time of day at different places on earth?	**Talk about what we already know about the Earth, Sun and Moon.** Draw and explain a picture showing how these would look to a traveller in space. Ask children questions about their drawings *eg* – *Is the Earth flat?* – *Is the Sun bigger than the Moon?* *Does the Sun move?* **Understand that the Sun, Earth and Moon are approximately spherical.** Explain why we know the Sun, Earth and Moon are spherical e.g. satellites **Understand that it is sometimes difficult to collect evidence to test scientific ideas and that evidence may**

	Can they create shadow clocks? Can they begin to understand how older civilisations use the sun to create astronomical clocks, e.g. Stonehenge? Can they explore the work of some scientists? (Ptolemy, Alhazen, Copernicus)	**be indirect.** *eg ships sailing round the world, ships appearing and disappearing over the horizon. Complete worksheet and write explanation underneath.* **Recognize the relative sizes of the Sun, Moon and Earth.** Put Earth, Moon and Sun in order of size by selecting from a range of spheres *eg football, beachball, tennis ball, pea, ball bearing, peppercorn, tiny beads about 1/4 size of pea, table tennis ball.* Recognize which is largest and which is smallest and making a reasonable match to relative size. Complete worksheet showing the sizes of each and then match up facts about each planet. **Understand that the Sun appears to move across the sky over the course of a day.** **Understand that evidence may be interpreted in more than one way.** Look at where the sun shines at shadows. Activity on shadows of the sun at times throughout the day. Compare lengths of shadows and positions. **Understand that it is the Earth that moves, not the Sun, and the Earth spins on its axis once every 24 hours.** **Understand that it is daytime in the part of the Earth facing the Sun and night-time in the part of the Earth away from the Sun** Use secondary sources *eg video, CD-ROM* to illustrate the Earth spinning on its axis. Explain that the apparent movement of the Sun is a result of the Earth rotating or

		spinning. Chn complete activities about the seasons and day and night. Label the shaded areas and to label the positions of the earth in each season in relation to the sun. **Recognize that the Sun rises in the general direction of the East and sets in the general direction of the West.** **Make observations of where the Sun rises and sets and to recognise the patterns in these.** **Present times of sunrise and sunset in a graph and to recognise trends and patterns in the data.** Use a compass to observe and record, on several days in the winter, the direction of the Sun or of shadows from the Sun throughout the day. Provide children with secondary data about times of sunrise and sunset and help them to present this data as a graph and to identify patterns in the data. Discuss. Complete graphs. Make predictions. **Understand that the Earth takes a year to make one complete orbit of the Sun, spinning as it goes.** **Understand that it is not always easy to gain information about phenomena *eg the length of a year* using first-hand experience.** A year is the time taken for the Earth to make one complete orbit of the Sun showing that they know this from secondary sources *eg reference books, CD-ROMs, information provided by the teacher.* **Order the planets in out solar system and understand**

		facts about them. Use the rhymes to help children order planets. Chn make up their own rhymes. Group research on a planet and make a drawing and fact sheet for their planet. Encourage chn to think of size when they draw their planets. **Understand that the Moon takes approximately 28 days to orbit the Earth.** **Recognize that the different appearance of the Moon over 28 days provides evidence for a 28-day cycle.** Use secondary sources *and demonstrations.* Explain that the pattern and time-scale of the changes in the Moon's appearance over 28 days is evidence that the Moon orbits the Earth once every 28 days. Order and name the phases of the moon. Name the time of orbit etc.
Additional Guidance	**Notes and guidance (non-statutory)** Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus. Pupils might work scientifically	

	by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.	

Science Scheme of Work

Year 5 Spring 2: Animals including humans		
Programme of Study	*Knowledge, Skills and Understanding*	*Activity/ Link to scheme of work*
Working Scientifically (skills)	<u>Planning</u> Can they plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables where necessary? Can they make a prediction with reasons? Can they use test results to make predictions to set up comparative and fair tests? Can they present a report of their findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations? (through writing, display and presentation) ***Challenging*** Can they explore different ways to test an idea, choose the best way and give reasons? Can they vary one factor whilst keeping the others the	**<u>Compare the gestation periods of animals.</u>** Research and place findings on a graph to show gestation periods. **<u>Create a graph to show changes in a babies growth</u>** Use date to outline changes to a baby. Suggest possible reasons for changes. Compare boys and girls.

	same in an experiment? Can they use information to help make a prediction? Can they explain, in simple terms, a scientific idea and what evidence supports it? <u>Obtaining and presenting evidence</u> Can they take measurements using a range of scientific equipment with increasing accuracy and precision? Can they take repeat readings when appropriate? Can they record more complex data and results using scientific diagrams, labels, classification keys, tables, scatter graphs, bar graphs and line graphs? ***Challenging*** Can they decide which units of measurements they need to use? Can they explain why a measurement needs to be repeated? <u>Considering evidence and evaluating</u>	

	Can they report and present findings from enquiries through written explanations and conclusions? Can they use a graph to answer scientific questions? Can they identify scientific evidence that has been used to support or refute ideas or arguments? ***Challenging*** Can they find a pattern from their data and explain what it shows? Can they link what they have found out to other science? Can they suggest how to improve their work and say why they think this?	
Scientific knowledge and understanding	Can they describe the changes as humans develop to old age? Can they describe the life process of reproduction in some plants and animals? ***Challenging*** Can they create a timeline to indicate stages of growth in certain animals, such as frogs and butterflies? Can they describe the changes experienced in puberty?	***<u>Order the human life cycle</u>*** *Introduce children to the life cycle of a human using the printout from the curriculum vision book and the handout about the stages in a human life cycle.* *Activity:* *Answer questions from the question sheet entitled 'guided reading task on human life cycle'.* *Children cut out images and label the life cycle of*

	Can they draw a timeline to indicate stages in the growth and development of humans?	*a human and give details of each stage of development e.g. time periods/ranges.* *List changes that occur at each stage.* **<u>Understand that flowering plants reproduce and this works in a cycle of life.</u>** Complete labels of the parts and he functions of each part. **<u>Draw the life cycle of a flowering plant</u>** *Children draw the life cycle of a flowering plant.* Then children will draw a diagram of the life cycle of a flower. Create a diagram of the life cycle with an explanation of each stage. **<u>Understand the difference between wind pollination and insect pollination</u>** Compare the two types of pollination. **<u>Order and explain the life cycle of a frog</u>** Create a timeline to indicate stages of growth in certain animals, such as frogs and butterflies

		Draw a life cycle of a frog using the w/s and will label each stage, the length and the details of each. **<u>Order and explain the life cycle of a butterfly</u>** Show timeline to indicate stages of growth in certain animals, such as frogs and butterflies They will then draw a life cycle of a butterfly using the w/s and will label each stage, the length and the details of each. **<u>Research and explain the life cycle of an animal.</u>** Children work in small groups to conduct their own independent research on a given animal. They will research how they start life, grow, change and become adults. They will explain how the life cycle changes at each stage and then starts over again. POSSIBLE IDEAS: chicken, newt, dragonfly, grasshopper, crocodile, cockroach, bat, spider, penguin, shark. Create a poster to present findings. **<u>Compare the gestation periods of animals.</u>** Research and place findings on a graph to show gestation periods. **<u>Understand the changes that hit people during puberty</u>**

		Watch videos to explain changes. Outline lists of changes that will happen. Outline age ranges. _____
Additional Guidance	**Notes and guidance (non-statutory)** Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty. Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.	

Science Scheme of Work

Year 5 Summer : Living things and their habitats		
Programme of Study	*Knowledge, Skills and Understanding*	*Activity/ Link to scheme of work*
Working Scientifically (skills)	<u>Planning</u> Can they plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables where necessary? Can they make a prediction with reasons? Can they use test results to make predictions to set up comparative and fair tests? Can they present a report of their findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations? (through writing, display and presentation) ***Challenging*** Can they explore different ways to test an idea, choose the best way and give reasons?	

	Can they vary one factor whilst keeping the others the same in an experiment? Can they use information to help make a prediction? Can they explain, in simple terms, a scientific idea and what evidence supports it? <u>Obtaining and presenting evidence</u> Can they take measurements using a range of scientific equipment with increasing accuracy and precision? Can they take repeat readings when appropriate? Can they record more complex data and results using scientific diagrams, labels, classification keys, tables, scatter graphs, bar graphs and line graphs? ***Challenging*** Can they decide which units of measurements they need to use? Can they explain why a measurement needs to be repeated? <u>Considering evidence and evaluating</u>	

	Can they report and present findings from enquiries through written explanations and conclusions? Can they use a graph to answer scientific questions? Can they identify scientific evidence that has been used to support or refute ideas or arguments? ***Challenging*** Can they find a pattern from their data and explain what it shows? Can they link what they have found out to other science? Can they suggest how to improve their work and say why they think this?	
Scientific knowledge and understanding	Can they describe the differences in the life cycles of a mammal, an amphibian, an insect, and a bird? Can they describe the life process of reproduction in some plants and animals? Can they describe the life cycles of common plants? Can they explore the work of well-known naturalists and animal behaviourists? (David Attenborough and Jane Goodall)	**Recognize the differences in the life cycles of mammals, amphibians, insects and birds.** Discuss the life cycle of humans and compare and contrast with those of other mammals, e.g. kangaroos & dogs. Identify features. Create a life cycle diagram of different mammals. They will compare these and contrast listing similarities and differences as presented. **Describe the life process of reproduction in some plants and animals**.

	Challenging Can they observe their local environment and draw conclusions about life-cycles, e.g. plants in the vegetable garden or flower border? Can they compare the life cycles of plants and animals in their local environment with the life cycles of those around the world, e.g. rainforests?	Research and make a poster to show the life cycle of an animal from a certain group e.g. reptiles, amphibians, birds, fish, mammals and arthropods. Present and discuss and similarities and differences. Alll chn complete life cycles of examples from each group: mammal, an amphibian, an insect and a bird. **Describe the life cycles of common plants** Recap on life cycles of flowering plants and plant some seeds to germinate & grow during the strand. Explain that plants can also reproduce asexually. Could plant bulbs, corms, tubers and cuttings of roots, stems & leaves to see if they can propagate new plants. Complete life cycle of a plant diagram. **Explore the work of well-known naturalists and animal behaviourists? (David Attenborough and Jane Goodall)** Show chn videos clips of David and Jane. Chn create a biography of David Attenborough or Jane Goodall. Allow chn to independently research. Complete biography.

		<u>Investigate the differences in life cycles around the school grounds</u>. Study and a chart of the plants and animals found in the school grounds. Study the life cycles of some non-flowering plants, e.g. algae, mosses, liverworts, ferns & gymnosperms, i.e. conifers, and compare them to flowering plants. **<u>Compare life cycles in Britain to those in another climate</u>** Understand that 1. Earth supports many different animal habitats, each of which has distinct features and distinct plant and animal populations. 2. Animals and plants are adapted to the conditions of the habitats in which they live. Research different habitats of the world. Each group will produce a report on its habitat. Present to class.

Additional Guidance	**Notes and guidance (non-statutory)** Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. Pupils might work scientifically by: observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how	

	different animals reproduce and grow.	

Science Scheme of Work

Year 6 – Electricity		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	**Planning** • Can they explore different ways to test an idea, choose the best way, and give reasons? • Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this? • Can they plan and carry out an investigation by controlling variables fairly and accurately? • Can they make a prediction with reasons? • Can they use information to help make a prediction? • Can they use test results to make further predictions and set up further comparative tests? • Can they explain, in simple terms, a scientific idea and what evidence supports it? • Can they present a report of their findings through writing, display and presentation? • Can they choose the best way to answer a question? • Can they use information from different sources to answer a question and plan an investigation? • Can they make a prediction which links with other scientific knowledge? • Can they identify the key factors when planning a fair test? • Can they explain how a scientist has used their scientific understanding plus good ideas to have a	Suggest a question to investigate, decide what to do and what equipment to use to test this, make fair comparisons and draw conclusions e.g., *Does the thickness of the wire affect the brightness of the bulb?* *Does it make a difference what the wire is made of?* *Does the length of wire affect the brightness of the bulb?* Explain observations in terms of knowledge about electrical circuits.

	breakthrough? **Obtaining and presenting evidence** • Can they explain why they have chosen specific equipment? (incl. ICT based equipment) • Can they decide which units of measurement they need to use? • Can they explain why a measurement needs to be repeated? • Can they record their measurements in different ways?(incl. bar charts, tables and line graphs) • Can they take measurements using a range of scientific equipment with increasing accuracy and precision? • Can they plan in advance which equipment they will need and use it well? • Can they make precise measurements? • Can they collect information in different ways? • Can they record their measurements and observations systematically? • Can they explain qualitative and quantitative data? **Considering evidence and evaluating** • Can they find a pattern from their data and explain what it shows? • Can they use a graph to answer scientific questions? • Can they link what they have found out to other science? • Can they suggest how to improve their work and say why they think this? • Can they record more complex data and results using scientific diagrams, classification keys,	

	tables, bar charts, line graphs, and models? • Can they report findings from investigations through written explanations and conclusions? • Can they identify scientific evidence that has been used to support to refute ideas or arguments? • Can they report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations? • Can they draw conclusions from their work? • Can they link their conclusions to other scientific knowledge? • Can they explain how they could improve their way of working?	
Scientific knowledge	• Can they identify and name the basic parts of a simple electric series circuit? (cells, wires, bulbs, switches, buzzers) • Can they compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers, the on/off position of switches? • Can they use recognised symbols when representing a simple circuit in a diagram? • Can they make their own traffic light system or something similar? • Can they explain the danger of short circuits? • Can they explain what a fuse is? • Can they explain how to make changes in a circuit? • Can they explain the impact of changes in a circuit?	Show children some working circuits and review the factors which change the brightness of bulbs or speed of motors *eg by changing the voltage of the battery, adding extra batteries, components.* Demonstrate the effect of overloading a circuit and then ask children to construct circuits *eg one with two dim bulbs, one where the buzzer can be switched on and off.* Discuss communication using conventional symbols *eg in mathematics, road safety.* Ask children to draw a diagram of a circuit they made. Compare children's diagrams and the symbols they

	• Can they explain the effect of changing the voltage of a battery?	used for particular components and introduce the conventional symbols for battery, wires, switches and bulbs. Ask children to draw circuit diagrams using these symbols for others to construct, to draw diagrams of circuits set up by others and to decide and explain whether they will work or not. Present children with diagrams of circuits and ask them to identify conventional symbols used in these.

Notes and guidance (non-statutory)

Building on their work in year 4, pupils should construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols.

Note: Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity.

Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.

Science Scheme of Work

Year 6 – Light		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	**Planning** • Can they explore different ways to test an idea, choose the best way, and give reasons? • Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this? • Can they plan and carry out an investigation by controlling variables fairly and accurately? • Can they make a prediction with reasons? • Can they use information to help make a prediction? • Can they use test results to make further predictions and set up further comparative tests? • Can they explain, in simple terms, a scientific idea and what evidence supports it? • Can they present a report of their findings through writing, display and presentation? • Can they choose the best way to answer a question? • Can they use information from different sources to answer a question and plan an investigation? • Can they make a prediction which links with other scientific knowledge? • Can they identify the key factors when planning a fair test? • Can they explain how a scientist has used their scientific understanding plus good ideas to have a	Remind children of shadow formation using an opaque object *eg a cardboard figure.* Ask them to explore ways in which the shadow of the figure can be made to change. Ask children to suggest questions they could investigate *eg What happens to the size of the shadow when you move the figure nearer the light?* Help children to decide how to carry out the investigation, including deciding on the measurements they are going to take. Ask children to record results and help them to present them in a line graph. Talk with children about patterns in the results and, if necessary, encourage them to repeat measurements to check them.

	breakthrough? **Obtaining and presenting evidence** • Can they explain why they have chosen specific equipment? (incl. ICT based equipment) • Can they decide which units of measurement they need to use? • Can they explain why a measurement needs to be repeated? • Can they record their measurements in different ways? (incl. bar charts, tables and line graphs) • Can they take measurements using a range of scientific equipment with increasing accuracy and precision? • Can they plan in advance which equipment they will need and use it well? • Can they make precise measurements? • Can they collect information in different ways? • Can they record their measurements and observations systematically? • Can they explain qualitative and quantitative data? **Considering evidence and evaluating** • Can they find a pattern from their data and explain what it shows? • Can they use a graph to answer scientific questions? • Can they link what they have found out to other science? • Can they suggest how to improve their work and say why they think this? • Can they record more complex data and results using scientific diagrams, classification keys,	

	tables, bar charts, line graphs, and models? • Can they report findings from investigations through written explanations and conclusions? • Can they identify scientific evidence that has been used to support to refute ideas or arguments? • Can they report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations? • Can they draw conclusions from their work? • Can they link their conclusions to other scientific knowledge? • Can they explain how they could improve their way of working?	
Scientific knowledge	• Can they recognise that light appears to travel in straight lines? • Can they 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? • Can they 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? • Can they use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them? • Can they explain how different colours of light can be created? • Can they use and explain how simple optical instruments work? (periscope, telescope, binoculars,	If appropriate, demonstrate to children or ask children to demonstrate to others that light travels *eg by shining a torch onto a wall and blocking the light half way using a piece of card.* Ask children to draw a diagram to explain what is happening. Ask children to explain how they see the light from the torch. Prompt by showing small light sources in dark areas and asking *eg Why we can see them more clearly when they are switched on?* Help children to draw diagrams to show and explain what is happening. Ask children to explore what they can see with a mirror by posing questions *eg Can you see behind you? Can you make a beam of light move round the*

	mirror, magnifying glass, Newton's first reflecting telescope) • Can they explore a range of phenomena, including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters?	*classroom?* Ask children to think of other questions to explore and to record and explain their observations in drawing and writing. Help children to represent the direction of a light beam using straight lines with arrows. Demonstrate to children, in a relatively dark area, what happens when a torch with a powerful beam is placed on a piece of white paper and shone at a mirror. Ask children to trace the path of the beam and of the reflected beam and to explore what happens when the light hits the mirror at different angles. Present children with a collection of shiny and dull surfaces *eg mirrors, polished metals, perspex, paper, gloss and matt painted surfaces, polished wood.* Ask children to find out which ones they can see themselves in and which ones reflect a torch beam, to record their results and to draw conclusions from their results. Ask children to use their own knowledge and secondary sources to identify everyday uses of mirrors.
Notes and guidance (non-statutory)		

Science Scheme of Work

Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.

Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).

Science Scheme of Work

Year 6 – Living Things & their habitats		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	**Planning** • Can they explore different ways to test an idea, choose the best way, and give reasons? • Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this? • Can they plan and carry out an investigation by controlling variables fairly and accurately? • Can they make a prediction with reasons? • Can they use information to help make a prediction? • Can they use test results to make further predictions and set up further comparative tests? • Can they explain, in simple terms, a scientific idea and what evidence supports it? • Can they present a report of their findings through writing, display and presentation? • Can they choose the best way to answer a question? • Can they use information from different sources to answer a question and plan an investigation? • Can they make a prediction which links with other scientific knowledge? • Can they identify the key factors when planning a fair test? • Can they explain how a scientist has used their scientific understanding plus good ideas to have a	Children should learn to: • use keys to identify animals and plants in a local habitat; • learn that animals and plants in a local habitat are interdependent; • how animals and plants in a local habitat are suited to their environment; • observe animals and plants found in different habitats and help children to use keys to identify unfamiliar animals and plants from living things, or from pictures; • use ICT databases to make an information card about an animal or plant in a given habitat (link to the Brazilian rainforest); • learn that different animals and plants are found in different habitats how they are suited to their environment; • construct food chains in a particular habitat (both local and unfamiliar); • use a mathematical model to count insects in the nature area.

	breakthrough? **Obtaining and presenting evidence** • Can they explain why they have chosen specific equipment? (incl. ICT based equipment) • Can they decide which units of measurement they need to use? • Can they explain why a measurement needs to be repeated? • Can they record their measurements in different ways?(incl. bar charts, tables and line graphs) • Can they take measurements using a range of scientific equipment with increasing accuracy and precision? • Can they plan in advance which equipment they will need and use it well? • Can they make precise measurements? • Can they collect information in different ways? • Can they record their measurements and observations systematically? • Can they explain qualitative and quantitative data? **Considering evidence and evaluating** • Can they find a pattern from their data and explain what it shows? • Can they use a graph to answer scientific questions? • Can they link what they have found out to other science? • Can they suggest how to improve their work and say why they think this? • Can they record more complex data and results using scientific diagrams, classification keys,	

	tables, bar charts, line graphs, and models? • Can they report findings from investigations through written explanations and conclusions? • Can they identify scientific evidence that has been used to support to refute ideas or arguments? • Can they report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations? • Can they draw conclusions from their work? • Can they link their conclusions to other scientific knowledge? • Can they explain how they could improve their way of working?	
Scientific knowledge	• Can they describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences including microorganisms, plants and animals? • Can they give reasons for classifying plants and animals based on specific characteristics? • Can they explain why classification is important? • Can they readily group animals into reptiles, fish, amphibians, birds and mammals? • Can they sub divide their original groupings and explain their divisions? • Can they group animals into vertebrates and invertebrates? • Can they find out about the significance of the	Children should learn to: • divide animals into vertebrates and invertebrates • research the 5 main vertebrate groups with their broad classifications. They will use keys to identify animals and plants; • be able to subdivide groups such as mammals or invertebrates into subgroups; • research helpful and harmful bacteria; • use keys to identify animals and plants; • create keys using identifiable criteria; • research the work of Carl Linnaeus, especially use of genus and species, and the system which is still used today.

	work of scientists such as Carl Linnaeus, a pioneer of classification?	

Notes and guidance (non-statutory)
Pupils should build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another.
Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.
Pupils might work scientifically by: using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.

Science Scheme of Work

Year 6 – Animals, including humans		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	**Planning** • Can they explore different ways to test an idea, choose the best way, and give reasons? • Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this? • Can they plan and carry out an investigation by controlling variables fairly and accurately? • Can they make a prediction with reasons? • Can they use information to help make a prediction? • Can they use test results to make further predictions and set up further comparative tests? • Can they explain, in simple terms, a scientific idea and what evidence supports it? • Can they present a report of their findings through writing, display and presentation? • Can they choose the best way to answer a question? • Can they use information from different sources to answer a question and plan an investigation? • Can they make a prediction which links with other scientific knowledge? • Can they identify the key factors when planning a fair test? • Can they explain how a scientist has used their scientific understanding plus good ideas to have a	Children will carry out a range of different activities to measure and observe the effects of exercise on the body, e.g., walking, running, skipping etc. measuring pulse rate before, during, after and resting rate. They will be encouraged to ensure a fair test and reliability of results. They will use drawings and tables to record their results, process the raw data into graphs to help generalize their findings which will enable them to draw conclusions from their findings.

	breakthrough? **Obtaining and presenting evidence** • Can they explain why they have chosen specific equipment? (incl. ICT based equipment) • Can they decide which units of measurement they need to use? • Can they explain why a measurement needs to be repeated? • Can they record their measurements in different ways?(incl. bar charts, tables and line graphs) • Can they take measurements using a range of scientific equipment with increasing accuracy and precision? • Can they plan in advance which equipment they will need and use it well? • Can they make precise measurements? • Can they collect information in different ways? • Can they record their measurements and observations systematically? • Can they explain qualitative and quantitative data? **Considering evidence and evaluating** • Can they find a pattern from their data and explain what it shows? • Can they use a graph to answer scientific questions? • Can they link what they have found out to other science? • Can they suggest how to improve their work and say why they think this? • Can they record more complex data and results using scientific diagrams, classification keys,	

	tables, bar charts, line graphs, and models? • Can they report findings from investigations through written explanations and conclusions? • Can they identify scientific evidence that has been used to support to refute ideas or arguments? • Can they report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations? • Can they draw conclusions from their work? • Can they link their conclusions to other scientific knowledge? • Can they explain how they could improve their way of working?	
Scientific knowledge	• Can they identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood? • Can they recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function? • Can they describe the ways in which nutrients and water and transported within animals, including humans? • Can they explore the work of medical pioneers, for example, William Harvey and Galen and recognise how much we have learnt about our bodies? • Can they compare the organ systems of humans to other animals? • Can they make a diagram of the human body and	Children should learn to: • draw the circulatory system in the body, thinking about oxygenated and deoxygenated blood; • understand the difference between arteries and veins; • describe the function of red and white blood cells; • observe and record various effects of exercise on the body; • reflect upon the benefits of a healthy balanced diet; • (link to PSHE) discuss the effects of drugs on the body, e.g., nicotine, alcohol; • research the digestive system using

	explain how different parts work and depend on one another? • Can they name the major organs in the human body? • Can they locate the major human organs? • Can they make a diagram that outlines the main parts of a body?	diagrams.

Notes and guidance (non-statutory)

Pupils should build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function.

Pupils should learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body.

Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.

Science Scheme of Work

Year 6 – Evolution and Inheritance		
Programme of Study	**Knowledge, Skills and Understanding**	**Activity/ Link to scheme of work**
Working Scientifically	**Planning** • Can they explore different ways to test an idea, choose the best way, and give reasons? • Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this? • Can they plan and carry out an investigation by controlling variables fairly and accurately? • Can they make a prediction with reasons? • Can they use information to help make a prediction? • Can they use test results to make further predictions and set up further comparative tests? • Can they explain, in simple terms, a scientific idea and what evidence supports it? • Can they present a report of their findings through writing, display and presentation? • Can they choose the best way to answer a question? • Can they use information from different sources to answer a question and plan an investigation? • Can they make a prediction which links with other scientific knowledge? • Can they identify the key factors when planning a fair test? • Can they explain how a scientist has used their scientific understanding plus good ideas to have a	Children will replicate different beak types to investigate the best at collecting food e.g., seed, filter eaters. They will be able to predict, carry out the investigation, record results and draw conclusions.

	breakthrough? **Obtaining and presenting evidence** • Can they explain why they have chosen specific equipment? (incl. ICT based equipment) • Can they decide which units of measurement they need to use? • Can they explain why a measurement needs to be repeated? • Can they record their measurements in different ways?(incl. bar charts, tables and line graphs) • Can they take measurements using a range of scientific equipment with increasing accuracy and precision? • Can they plan in advance which equipment they will need and use it well? • Can they make precise measurements? • Can they collect information in different ways? • Can they record their measurements and observations systematically? • Can they explain qualitative and quantitative data? **Considering evidence and evaluating** • Can they find a pattern from their data and explain what it shows? • Can they use a graph to answer scientific questions? • Can they link what they have found out to other science? • Can they suggest how to improve their work and say why they think this? • Can they record more complex data and results using scientific diagrams, classification keys,	

	tables, bar charts, line graphs, and models? • Can they report findings from investigations through written explanations and conclusions? • Can they identify scientific evidence that has been used to support to refute ideas or arguments? • Can they report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations? • Can they draw conclusions from their work? • Can they link their conclusions to other scientific knowledge? • Can they explain how they could improve their way of working?	
Scientific knowledge	• Can they identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood? • Can they recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function? • Can they describe the ways in which nutrients and water and transported within animals, including humans? • Can they recognize that living things have changed over time? • Can they understand that fossils provide information about living things that inhabited the Earth millions of years ago? • Can they recognize that living things provide	Children should learn to: • create a poster to understand the impact of the work of Mary Anning • look at and draw a range of fossils • make a cartoon strip to describe the formation of a fossil • write a biography of the life of Charles Darwin • replicate different beak types to investigate the best at collecting food • use a simple grid to show inherited traits e.g., hair colour, eye colour.

	offspring of the same kind, but can vary and are not identical to parents? • Can they identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution?	

Notes and guidance (non-statutory)

Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living things on earth have changed over time. They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.

Note: At this stage, pupils are not expected to understand how genes and chromosomes work.