



Science Curriculum

EYFS to Year 6



Overarching Principles

Science

Subject Intent

- Children to know that science is a subject – focusing on learning about how things work – including living things
- Understand that 'working scientifically' is at the heart of science– and what kinds of simple investigations we can use. Using and understanding the school 'working scientifically' expectations alongside the 'Disciplinary Knowledge' document.
- Understand that scientific knowledge is usually factual, not an opinion
- The curriculum covers most 'Big Ideas' several times to assure depth of knowledge
- Know the key knowledge identified in each unit, so that they have a firm knowledge base to study individual science disciplines from Key Stage 3

Substantive Dimension

- Physics, biology, Chemistry, Earth Sciences

Disciplinary Dimension

- The pursuit of knowledge through empirical testing

Connecting Themes

- Sequential presentation of substantive elements, through 'Big Ideas'
- Scientific enquiry within all substantive dimensions

Key Subject Teaching Approaches

- Science is a fine balance between direct instruction and scientific enquiry
- Lessons will begin with a spaced retrieval session of vital knowledge and vocabulary which children need to know in order to build their learning; vocabulary is high value and high priority
- All units of work with encompass a range of scientific enquiry approaches; including empirical testing

Misconceptions

It is believed that students construct their understanding of the world through their observations and interacting with their peers, creating a coherent set of 'alternative conceptions' based on common sense, but working, logic (Rosalind Driver).

Some examples of misconceptions:

- Plants get their food from the soil.
- Particles expand when they are heated.
- Light travels from student's eyes to the object.

How to explore misconceptions in the classroom:

Multiple choice questions

Children can select scientific answers from a series of options, one of which will contain the misconception. To discuss and talk about the answers including the misconception.

Open-ended questions

These are a great way to explore the learners' thinking processes e.g. are humans still evolving?

Using statements

Provide students with some statements about scientific concepts. Children must comments whether the statement is correct, partially correct or incorrect, and justify their answer with reasons.

For example:

Year 4 sound topic children may be able to say, "We can hear because sound waves enter the outer ear and travel."

This is partially correct. Children could expand and discuss that it needs to travel to the ear drum.

Practical work

Investigation the concept through practical work can also address the misconception. Children can identify what might happen. They can then see if their prediction is correct. If it is wrong, this can result in cognitive conflict.

Concept cartoons

These are a visual representation of science ideas. The simple cartoon-style drawings present a range of possible viewpoints about an everyday scientific concept. Some of the view points may be correct; some partially correct or may illustrate a misconception related to a scientific concept.



The 'Big Ideas' Across our Science Curriculum

Physics

P1: The universe follows unbreakable rules that are all about forces, matter and energy.

P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe.

P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.

Chemistry

C1: All matter (stuff) in the universe is made up of tiny building blocks.

C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).

C3: Matter can change if the arrangement of these building blocks changes.

Biology

B1: Living things are special collections of matter that make copies of themselves, use energy and grow.

B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago.

B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.

Earth Science

E1: The Earth is one of eight planets that orbit the sun.



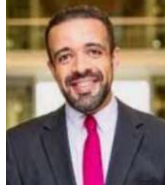











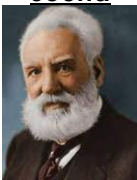



E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.









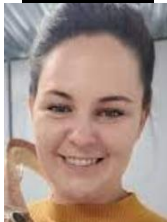


E3: The Earth is made up of several layers, including a relatively thin rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)

Big Idea Map

Year Group	Physics			Chemistry			Biology			Earth Science		
	P1	P2	P3	C1	C2	C3	B1	B2	B3	E1	E2	E3
1				Spring	Spring			Autumn Summer 2	Autumn	Summer 1		
2				Autumn	Autumn		Spring Summer	Spring				
3	Spring 1, 2	Autumn 2	Spring 1,2	Autumn 1	Autumn 1	Autumn 1	Summer	Summer	Summer			Autumn 1
4	Autumn 2 Spring 1		Autumn 2 Spring 1	Spring 2	Spring 1 Spring 2	Spring 2		Summer	Autumn 1 Summer			
5	Autumn 2	Autumn 2			Spring Summer 1	Spring Summer 1	Summer			Autumn 1	Autumn 1	
6	Autumn 1 Autumn 2		Autumn 1 Autumn 2				Summer	Spring 1	Spring 2			

Topic Map (including key topic specific scientists)

Year Group	Autumn		Spring	Summer	
1	<u>Animals Including Humans</u>  Jane Goodall Studied primates		<u>Everyday Materials</u>  Charles Macintosh Invention for making waterproof garments.	<u>Seasonal Change</u>  Liam Dutton Weatherperson and meteorologist.	<u>Plants</u>  Beatrix Potter Botanist
2	<u>Uses of Everyday Materials</u>  Leo Baekeland Invented plastics		<u>Living Things and Life Cycles</u>  Rachel Carson Taxonomist and wildlife filmmaker	<u>Plants</u>  Marie Clark Taylor Influence of light on plant growth	<u>Animals including Humans</u>  Dr Kelly Blacklock Veterinary Surgeon
3	<u>Rocks and Fossils</u>  Mary Anning Fossilist	<u>Forces and Magnets</u>  William Gilbert Magnetism	<u>Light</u>  Isaac Newton Optics (White light Composition)	<u>Plants</u>  Dr Kelsey Byers Biologist who studies flower smells.	<u>Animals</u>  Yann Le Meur Sports Scientist
4	<u>Animals including Humans</u>  Jill Robinson Animal activist	<u>Sound</u>  Alexander Graham Bell Patenting the first practical telephone	<u>Electricity</u>  Thomas Edison Photograph	<u>Solids, Liquids and Gasses</u>  Marie Curie – polonium and radium	<u>Living things and their Habitat</u>  Jacques Cousteau Oceanographer

5	<u>Earth and Space</u>  Stephen Hawking Origins and universe structure	<u>Forces</u>  <u>George Cayley</u> Designed the first glider to carry a human.	<u>Properties and Changes of Materials</u>  Becky Schroeder Inventor of the glow sheet		 Sarah Gilbert Covid-19 Vaccine	<u>Living things and Life Cycles</u>  David Attenborough Naturalist	
6	<u>Light</u>  Alhazen Theory of light travelling in straight lines	<u>Electricity</u>  Joseph Swan Lightbulb	<u>Living Things and their Habitats</u>  Carl Linnaeus Plant classification	<u>Evolution and Adaptation</u>  Charles Darwin Emma Dunne Palaeobiologist	<u>Animals Inc Humans</u>  William Harvey Blood circulation Function on the heart		 Sarah Fowler OBE Zoology

*This unit of work is covered across the year, with this unit drawing learning together

Early Years Foundations of Learning

Across reception, scientific knowledge and skills are explicitly taught as foundations for the KS1 National Curriculum.

The science learning opportunities topics allow children to develop knowledge and skills in order for them to reach the requirements of the 'The Natural World' Early Learning Goal.

ELG: The Natural World

Children at the expected level of development will:

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

Term	Reception Science Topics	Links to KS1 Science Topic
Autumn 1	This is me ...	Animals including humans – Year 1
Autumn 2	Autumn (Harvest)	Seasonal changes – Year 1
Spring 1	Winter (clothes, Polar animals, penguins)	Everyday materials - Year 1
Spring 2	Easter (Spring, New life)	Seasonal changes – Year 1 Living Things and Life Cycles – Year2
Summer 1	Farm Life	Animals including humans – Year 1
Summer 2	Green Fingers	Plants – Year 1 Living Things and Life Cycles - Year2

EYFS Science Topics

Year Group Scientist: David Attenborough

In addition to the topics listed below, the children will have the opportunity to constantly learn about the world around them. They will explore the local environment in Autumn, Winter, Spring and summer, noticing similarities and differences, taking photographs and making a big book. They will discuss the weather each day and notice how the weather changes through the seasons. The children will also be encouraged to notice the moon and its phases (full moon, half moon, crescent moon and gibbous moon). There will be an exploration table (display of interesting things) in the EYFS classroom where the children will be encouraged to use magnifying glasses and photographs to look closely, ask and answer questions. We will also seize the moment for example on a windy day provide wind chimes, windmills, bubbles, kites ... to explore the effects of wind, play with shadows on a sunny day, make ice when the weather is freezing. The children will cook/bake regularly and discuss changes. They will be given the opportunity to grow and take care of a variety of plants.

Topic Title: This is me ...		Half term: Autumn 1
What will be taught – key ideas?	Key Language introduced and reinforced	Big Idea
<p>To draw a picture and talk about our own families – to know there are similarities and differences within families.</p> <p>To understand and talk about being similar and different to each other. Make observations and paint self-portraits naming features correctly.</p> <p>To know that some things stay the same and some things change as we grow up.</p> <p>To name common body parts through songs, rhymes, games and pictures.</p> <p>Sort ourselves into 2 groups – boys/girls, long hair/short hair, brown eyes/ blue eyes etc</p> <p>Question – is the oldest person in our class the tallest?</p> <p>Begin to formulate own questions – adults to scaffold the process to begin with – Who is the tallest? Youngest? How many people wear glasses? etc</p> <p>Read – Growing up, We are all different, Titch</p>	<p>Baby Child Adult Elderly</p> <p>Boy, girl, male, female same/similar, different</p> <p>Head, neck, face, shoulders, arms, legs, hands, feet, ankle, elbow, knee, fingers, toes, eyes, nose, mouth, chin, cheeks etc</p>	<p>Biology</p> <p>B1: Living things are special collections of matter that make copies of themselves, use energy and grow.</p>
Topic Title: Autumn (Harvest)		Half term: Autumn 2
What will be taught – key ideas?	Key Language introduced and reinforced	'Core Concept' Foundations (delete as applicable)

<p>Go for an Autumn walk and collect things to bring back to school. What do we see, hear, smell or find in Autumn time? Ask the children to bring things in from their own family walks too. Make a collection with labels and questions.</p> <p>Make observations. Look at the colour of the leaves. Make an Autumn tree display. Encourage the children to look closely at the different shapes of leaves. Take Leaf rubbings and make mobiles.</p> <p>Which wild animals live in our local environment – ask the children to name them and describe them. Where do they live? What do they eat? Make each animal and add it to our Autumn display.</p> <p>Introduce the children to the correct vocabulary for the local wild animals. Name their babies.</p> <p>On the interest table put the life cycle of an owl for discussion.</p> <p>Questions – would a squirrel make a good pet? Why? Are all dogs the same? Explore</p> <p>Look at a variety of fruit. Name and describe it (colour, shape, smell). Where does it come from? How is it grown? Photographs of it growing.</p> <p>Investigation – which fruit has the most seeds? Are all the seeds the same? Cut into the fruit. Discuss similarities and differences between the seeds. Show photographs of it growing ...</p> <p>To know that fruit contains seeds and vegetables do not.</p> <p>Question – which is the most popular fruit? pictograph</p> <p>Look at a variety of vegetables. Name and describe it. Where does it come from? How is it grown? Which part do we eat?</p> <p>Investigation – what happens to fruit/vegetables if left uneaten? Formulate own questions – once again adults to scaffold the process.</p>	<p>Season Autumn Change Weather Habitat Tree, bark, branch, twig, stick, leaf</p> <p>Horse chestnut tree Oak tree Conker, acorn,</p> <p>Wild animal Domestic animal, pet</p> <p>The same, similar, different</p> <p>Dog – puppy Cat – kitten Fox – cub – Den Rabbit – kitten – Burrow Badger – Cub – Set</p> <p>Fruit, seeds, stones, pips</p> <p>Vegetables, roots, stems and leaves, rotten, decompose</p>	<p>Biology B1: Living things are special collections of matter that make copies of themselves, use energy and grow. B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.</p> <p>Earth Science E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.</p>
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Read books about Autumn both fiction and non-fiction. Read Percy the park keeper stories, the Leaf Man,		
Topic Title: Winter (clothes, polar animals, penguins)		Half term: Spring 1
What will be taught – key ideas?	Key Language introduced and reinforced	'Core Concept' Foundations (delete as applicable)
<p>Go for a winter walk. Discuss what we should wear and why. Look at the bare trees. What is winter like? Discuss the weather. Talk about the wild animals hibernating.</p> <p>Sort a collection of clothes into two hoops winter and summer. Name and describe each item. What is it? Why do we wear it? What does it feel like? Talk about similarities and differences.</p> <p>Question – would a scarf be made from plastic? Paper?</p> <p>Draw attention to thick, warm clothes, waterproof clothes, thin, cool clothes. Clothes need to be comfortable. Adults to use the correct vocabulary – wool, cotton, leather, rubber, plastic, thick, thin, waterproof, warm and cool.</p> <p>Look at the Arctic and Antarctica. Name and describe the wild animals that live there. Compare them to our local wild animals. Find out what the correct vocabulary for the male, female and baby is. Ask questions about them and find the answers from books or internet.</p> <p>Investigation – Can we make ice? what is ice?</p> <p>Question – should polar animals be kept in zoos? Discuss</p> <p>Look more closely at penguins. Carry out a penguin study. Are all penguins the same? How are they similar/different? make a fact book, penguin display.</p> <p>Read books about Winter both fiction and non-fiction. – Read a little bit of winter.</p> <p>Read books about penguins both fiction and non-fiction.</p>	<p>Season Winter Cold Frosty Wet Foggy Icy and snow Ice – melt – drip – solid – liquid – water – pour Change Antarctica</p> <p>Material Wool Cotton Rubber Leather Plastic</p> <p>Warm and cool Thick, thin, soft, hard, comfortable, waterproof</p> <p>The Same, Similar, different</p> <p>Daylight Darkness Hours</p>	<p>Chemistry C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).</p> <p>Biology B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.</p> <p>Earth Science E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.</p>
Topic Title: Spring (New Life)		Half term: Spring 2
What will be taught – key ideas?	Key Language introduced and reinforced	'Core Concept' Foundations (delete as applicable)

<p>Make a mind map – What might we find on our spring walk? Have the children got any questions?</p> <p>Go for a spring walk. Look at the trees, bushes, grass... What can you see, hear, smell? Compare to Autumn and winter. Discuss the weather. Talk about new life in terms of plants and animals. Make a spring interest table.</p> <p>Show the children pictures of baby animals that will be in the fields and parks around us. Can they name them? Foal, lamb, calf, piglet, chick, gosling, duckling ... Play games and have quizzes.</p> <p>Visit the farm – Big Sheep, Little Cow – feed a lamb, wash a piglet, ride in a tractor ...</p> <p>On the interest table put the life cycle of a frog both visual and small world (plastic animals). Make a small pond.</p> <p>On the interest table put the life cycle of a dandelion – try to collect it too.</p> <p>Buy live caterpillars and make observations of them. Take care of them and watch their life cycle – first-hand experience.</p> <p>Mini beast study – build a bug hotel outside. Identify and classify bugs.</p> <p>Option to buy duck eggs!!! Must have somewhere to set them free before buying.</p> <p>Read stories set in spring both fiction and non-fiction. Read – The Very Hungry Caterpillar, Baby Goz, what the ladybird heard ... The Gruffalo</p>	<p>Season Spring - Weather warm sunny</p> <p>Tree, bark, branch, twig, stick, leaf</p> <p>same, similar, different</p> <p>new life, buds, blossom</p> <p>wild flowers – daisy, dandelion ...</p> <p>Foal, lamb, calf, piglet, chick, gosling, duckling, fry ... Caterpillar, chrysalis, butterfly Frogspawn, Tadpole, froglet, frog</p> <p>Habitat</p>	<p>Biology B1: Living things are special collections of matter that make copies of themselves, use energy and grow. B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago. B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.</p> <p>Earth Science E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate</p>
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Topic Title: Farm Life	Half term: Summer 1
What will be taught – key ideas?	Key Language introduced and reinforced
	'Core Concept' Foundations (delete as applicable)

<p>Make a mind map – What might we find at the farm? Have the children got any questions? Make a note and support.</p> <p>Set up a role play farm shop outside. Small world farm inside.</p> <p>Visit to farm – Big Sheep, Little Cow. Make first-hand observations and discuss the features of a farm environment. Compare this to our school environment in terms of similarities and differences.</p> <p>Question -What animals live on a farm? Would a cow make a good pet? Why? Do all cows/ horses look the same?</p> <p>Draw/paint/ collage farm animals. Introduce the correct vocabulary for male, female and baby animals– e.g horse, mare, stallion, foal, cow, bull, calf etc – PowerPoint presentation. Create an interactive classroom display.</p> <p>Discuss similarities and difference between the animals. Small world Farm.</p> <p>Sort farm animals into different criteria. Animals with 4 legs, 2 legs, where do they live on the farm? What do they eat?</p> <p>Sort and match baby animals to their parents. What things stay the same and what things change as they grow up?</p> <p>Have a quiz – farm animals what am I? Introduce the correct vocabulary for a group of animals – flock, herd, gaggle, crowd, shoal</p> <p>Discuss where food comes from e.g milk, bread, bacon, lamb chop, eggs ...</p> <p>Share lots of stories set on farms – both fiction and non-fiction. Read Farmer Duck</p>	<p>Farm, Farmyard, farmhouse Field Barn Stable Hay Haystack Pen Pigsty</p> <p>Environment same, similar, different</p> <p>Tractor Combine harvester Trailer Scarecrow</p> <p>Foal, lamb, calf, piglet, chick, gosling, duckling, kid</p> <p>Flock of sheep Herd of cows Gaggle of geese Crowd of people</p>	<p>Biology</p> <p>B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago.</p>
<p>Topic Title: Green Fingers</p>		<p>Half term: Summer 2</p>
<p>What will be taught – key ideas?</p>	<p>Key Language introduced and reinforced</p>	<p>'Core Concept' Foundations (delete as applicable)</p>

<p>Set up a garden Centre role play area outside. Discuss the different roles that the children can take on.</p> <p>Set up Mr McGregor's Garden (Peter Rabbit) in the builder's tray for exploration put unusual vegetables, seeds and gardening equipment.</p> <p>Begin by looking at a variety of flowering and non-flowering plants. Provide magnifying glasses. Ask the children to draw and label a simple plant. Are they all the same – discuss similarities and differences.</p> <p>Grow tomatoes in the classroom so that the children can see the blossom turn into the fruit. Taste tomatoes – show variety.</p> <p>Question – Are tomatoes always red?</p> <p>All children to plant their own giant sunflower seeds. Keep a plant diary. Use strong, clear plastic pots so that they can see the roots.</p> <p>Make observations through photographs and drawings. Take care of our plants. What do they need?</p> <p>Investigation - Will a seed still grow without water?</p> <p>Make a giant collage sunflower and label it.</p> <p>On the interest table put the life cycle of a sunflower – try to collect it too.</p> <p>Share lots of stories about growing plants – both fiction and non-fiction.</p> <p>Read katie's sunflowers, Jack and the Beanstalk, Jasper's beanstalk, Peter Rabbit stories,</p>	<p>Plants Seeds Bulbs Soil/ compost Plant pot Trowel Wheel barrow</p> <p>Blossom Fruit Roots, stem, leaves, flower</p> <p>Sunlight, warmth, water</p> <p>same, similar, different</p> <p>care</p>	<p>Biology</p> <p>B1: Living things are special collections of matter that make copies of themselves, use energy and grow.</p>
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Assessment in Science

Assessing children against key knowledge and understanding is vital to ensure that key learning 'sticks' for future learning and adulthood. As such, we use the key knowledge identified in the Teacher Assessment Frameworks to assess children against. This assessment is a bank of formative assessments, which build towards a summative picture. Teachers assess against each criteria, away from the point of teaching, to ensure that the children retain the key knowledge required. These assessments can take the form of low stakes quizzes, simple tasks and tests and simply talking with children to illicit their understanding.

For Key Stage 1, the key learning statements are:

Working scientifically (these are assessed throughout pupils ongoing work)

The pupil can, using appropriate scientific language from the national curriculum:

- ask their own questions about what they notice
- use different types of scientific enquiry to gather and record data, using simple equipment

where appropriate, to answer questions:

- ☐ observing changes over time
- ☐ noticing patterns
- ☐ grouping and classifying things
- ☐ carrying out simple comparative tests
- ☐ finding things out using secondary sources of information

- communicate their ideas, what they do and what they find out in a variety of ways.

Science content

The pupil can:

- name and locate parts of the human body, including those related to the senses [year 1], and describe the importance of exercise, a balanced diet and hygiene for humans [year 2]
- describe the basic needs of animals for survival and the main changes as young animals, including humans, grow into adults [year 2]
- describe the basic needs of plants for survival and the impact of changing these and the main changes as seeds and bulbs grow into mature plants [year 2]
- identify whether things are alive, dead or have never lived [year 2]

- describe and compare the observable features of animals from a range of groups [year 1]
- group animals according to what they eat [year 1], describe how animals get their food from other animals and/or from plants, and use simple food chains to describe these relationships [year 2]
- describe seasonal changes [year 1]
- name different plants and animals and describe how they are suited to different habitats [year 2]
- distinguish objects from materials, describe their properties, identify and group everyday materials [year 1] and compare their suitability for different uses [year 2].

For Key Stage 2, the key learning statements are:

Working scientifically

The pupil can, using appropriate scientific language from the national curriculum:

- describe and evaluate their own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources
- ask their own questions about the scientific phenomena that they are studying, and select the most appropriate ways to answer these questions, recognising and controlling variables where necessary (i.e. observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests, and finding things out using a wide range of secondary sources)
- use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate
- record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- draw conclusions, explain and evaluate their methods and findings, communicating these in a variety of ways
- raise further questions that could be investigated, based on their data and observations.

Science content

The pupil can:

- name and describe the functions of the main parts of the digestive [year 4], musculoskeletal [year 3] and circulatory systems [year 6]; and describe and compare different reproductive processes and life cycles in animals [year 5]
- describe the effects of diet, exercise, drugs and lifestyle on how the body functions [year 6]
- name, locate and describe the functions of the main parts of plants, including those involved in reproduction [year 5] and transporting water and nutrients [year 3]

- use the observable features of plants, animals and micro-organisms to group, classify and identify them into broad groups, using keys or other methods [year 6]
- construct and interpret food chains [year 4]
- describe the requirements of plants for life and growth [year 3]; and explain how environmental changes may have an impact on living things [year 4]
- use the basic ideas of inheritance, variation and adaptation to describe how living things have changed over time and evolved [year 6]; and describe how fossils are formed [year 3] and provide evidence for evolution [year 6]
- group and identify materials [year 5], including rocks [year 3], in different ways according to their properties, based on first-hand observation; and justify the use of different everyday materials for different uses, based on their properties [year 5]
- describe the characteristics of different states of matter and group materials on this basis; and describe how materials change state at different temperatures, using this to explain everyday phenomena, including the water cycle [year 4]
- identify and describe what happens when dissolving occurs in everyday situations; and describe how to separate mixtures and solutions into their components [year 5]
- identify, with reasons, whether changes in materials are reversible or not [year 5]
- use the idea that light from light sources, or reflected light, travels in straight lines and enters our eyes to explain how we see objects [year 6], and the formation [year 3], shape [year 6] and size of shadows [year 3]
- use the idea that sounds are associated with vibrations, and that they require a medium to travel through, to explain how sounds are made and heard [year 4]
- describe the relationship between the pitch of a sound and the features of its source; and between the volume of a sound, the strength of the vibrations and the distance from its source [year 4]
- describe the effects of simple forces that involve contact (air and water resistance, friction) [year 5], that act at a distance (magnetic forces, including those between like and unlike magnetic poles) [year 3], and gravity [year 5]
- identify simple mechanisms, including levers, gears and pulleys, that increase the effect of a force [year 5]
- use simple apparatus to construct and control a series circuit, and describe how the circuit may be affected when changes are made to it; and use recognised symbols to represent simple series circuit diagrams [year 6]
- describe the shapes and relative movements of the Sun, Moon, Earth and other planets in the solar system; and explain the apparent movement of the sun across the sky in terms of the Earth's rotation and that this results in day and night [year 5].

Year 1

Year 1 – Ongoing throughout year – Working scientifically	
NC objectives	Key knowledge and vocabulary
<p>Sc1/1.1 asking simple questions and recognising that they can be answered in different ways</p> <ul style="list-style-type: none"> Can explore the topic question (To be found with each topic). Making sure you use; pictures, images, real life – Use Explorify) Let children touch explore ask questions. Can answer with the support of STEM sentences and a word bank. Can answer with the support of word banks. With support, can recognise that there are different ways in which questions can be answered. <p>Sc1/1.2 observing closely, using simple equipment (Observation over time can take place over any period of time.)</p> <ul style="list-style-type: none"> Can observe a whole class investigation ran by an adult. Can observe something changing and growing. Can explain what they have seen using basic terms. Can name a range of scientific equipment (word bank) Can use a range of scientific equipment with support. Can engage in discussion about the risk around some investigations. <p>Sc1/1.3 performing simple tests (Observe and measure the effect changing one variable has on another whilst keeping all other variables the same. Children may have less control over the variables in a comparative test.</p> <ul style="list-style-type: none"> Can use the equipment given to them Can discuss how to stay safe. Can participate in whole class investigations. Can follow 3-4 instructions with support. <p>Sc1/1.4 identifying and classifying (It involves sorting objects, materials, living things or events into manageable sets using different criteria)</p> <ul style="list-style-type: none"> Can use a Venn diagram with given headings. Can sort 10-15 objects into given headings. Can discuss differences and similarities using adult support. Can, in small groups, use a camera to take a picture – talk about observations with another groups – support by an adult. Can draw a picture of their observations – children to be given a STEM sentence to help them explain their observations. <p>Sc1/1.5 using their observations and ideas to suggest answers to question</p> <p>Sc1/1.6 gathering and recording data to help in answering questions</p> <ul style="list-style-type: none"> Add gathered data from a class investigation to a premade table or tally chart (support). Add gathered data from a class investigation to a premade pictogram Add gathered data from a class investigation to a premade tally chart. Aide their observations or enquiries by using: <ul style="list-style-type: none"> a magnifying glass - torches -meter sticks -tape measures -scales stop watches - beakers -pipettes Discuss evidence for their understanding (Using scientific vocabulary) Fill in STEM sentences with word banks Record data by: observational drawings (adding labels when appropriate) and taking photographs. Record measurements by: pictograms (everything given – they draw the picture. Record classification be – Venn diagram (heading given) 	<p><u>New learning and vocabulary</u></p> <p>properties, observe, test, magnifying glass, object, record, equipment, tally, pictogram, table</p> <p>Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science</p> <p>Know that we can use magnifying glasses to observe objects closely</p> <p>Know that we can test our questions to see if they are true</p> <p>Know that objects can be identified or sorted into groups based on their observable properties</p> <p>Know that we can write down numbers and words or draw pictures to record what we find</p> <p>Possible questions to ask:</p> <p>Comparative and fair testing</p> <ul style="list-style-type: none"> Which type of compost grows the tallest sunflower? Which tree has the biggest leaves? Is out sense of smell better when we can't see? In which season does it rain the most? Which materials are the most flexible? Which materials are the most absorbent? <p>Observations over time?</p> <ul style="list-style-type: none"> How does a daffodil bulb change over the year? How does my sunflower change each week? How does the oak tree change over the year? How does my height change over the year? What happens to materials over time if we bury them in the ground? What happens to shaving foam over time? <p>Pattern Seeking</p> <ul style="list-style-type: none"> Do trees with bigger leaves lose their leaves first? Is there a pattern in where we find moss growing in the school grounds? Do you get better at smelling, as you get older? Does the wind always blow the same way Is there a pattern in the types of materials that are used to make objects in a school? <p>Identifying, classifying and grouping</p> <ul style="list-style-type: none"> How can we sort the leaves that we collected on our walk? How can we organize all the zoo animals? What are the names for all the parts of our bodies? How would you group these things based on which season you are most likely to see them in? We need to choose a material to make an umbrella. What materials are waterproof? What material will float and which will sink? <p>Researching using secondary sources</p> <ul style="list-style-type: none"> What are the most common British plants and where can we find them? How are the animals in Australia different to the one that we find in Britain? Do all animals have the same senses as humans? Are there plants that are in flower in every season? What are they? How are bricks made? Which materials can be recycled?

Year 1 – Autumn 1 and 2 – Animals including humans

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc1/2.2a identify and name a variety of common animals including, fish, amphibians, reptiles, birds and mammals</p> <p>Sc1/2.2b identify and name a variety of common animals that are carnivores, herbivores and omnivores</p> <p>Sc1/2.2c describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)</p> <p>Sc1/2.2d identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</p>	<ul style="list-style-type: none"> Label and match animals – using pictures Recognise five animal groups through discussion Can sort animals into the groups Sort food eaten by carnivore, herbivore and omnivore Sort animals into these groups. Label the parts of the body for two animals from different groups Same as above with animals from all groups Find similarities and differences. Point and identify the parts of the body. Label parts of the body. Match the body parts to the senses. 	<p><u>Big idea(s):</u> B2, B3</p> <p><u>Famous scientist –</u> Jane Goodall</p> <p><u>Possible Scientific question:</u></p> <ul style="list-style-type: none"> ❖ Can you tell what an animal eats based on its looks? ❖ What part of the body links to a sense? <p><u>New learning and vocabulary</u> energy, growth, habitat, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, skeleton, organ</p> <p>Know that a trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal</p> <p>Know that herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants</p> <p>Know that a cat is an example of a carnivore; that a rabbit is an example of a herbivore; know that many humans are examples of omnivores (though not vegetarians)</p> <p>Know that fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone</p> <p>Know that fish are different in having gills so that they can breathe underwater and scaly skin</p> <p>Know that amphibians are different in that they begin their lives with gills but then develop lungs and breath on land</p> <p>Know that reptiles are different in that they breath air and have scaly skin</p> <p>Know that birds are different to other animals in that they have feathers and wings</p> <p>Know that mammals are different to other animals in that they have fur/hair and they feed milk to their young</p> <p>Know that feet, legs, arms, hands, torso, head, skin, ears, eyes, nose, mouth and tongue are part so the body and identify them</p> <p>Know that eyes are associated with sight, ears with sound, nose with smell, tongue with taste and skin with touch.</p>

Year 1 - Summer 1 – Seasonal changes

NC objectives		Key knowledge and vocabulary
Sc1/4.1a	observe changes across the 4 seasons	<p><u>Big idea(s)</u>: E2</p> <p><u>Famous Scientist</u>: Liam Dutton</p> <p><u>Possible Scientific Question</u>:</p> <ul style="list-style-type: none"> Is it light for the same amount of time every day? Do different countries turn their head lights on at the same time? What would happen if there was too much rain/sun? <p><u>New learning and vocabulary</u> energy, freezing, melting, orbit, reflection, Sun, clouds, wind, snow, ice, spring, summer, autumn, winter</p> <p>Know that days are longer in the summer and shorter in winter Know that weather changes through the year, getting hotter in the summer and colder in the winter Know that the winter is likely to bring ice on the ground when water freezes due to the cold Know that the Earth orbits the Sun with one orbit constituting a year of 365/366 days</p> <p>(NB: the Sun and the Earth are capitalized when being discussed in an astronomical context.)</p>
Sc1/4.1b	observe and describe weather associated with the seasons and how day length varies.	<ul style="list-style-type: none"> Match pictures of the seasons to the seasons names Match definitions of the seasons to their names Match clothing worn across the seasons and give reasons for the change in clothing Describe what typical weather is like in the UK in four seasons – Winter is cold (provide a word mat) Order changes of a deciduous tree throughout the seasons. Order the changes of a bulb plant across the four seasons. <ul style="list-style-type: none"> Match pictures of weather types with their names Record weather changes across a week/year – identify weather and temperature Create a pictogram of weekly/monthly weather Discuss similarities and differences of weather across a week Match weather types to the season names Match and discuss measuring tools with the weather. E.G. Thermometer – temperature. Rain gauge – rainfall Create a rain gauge . Compare the rainfall across two season.

Year 1 - Summer 2 – Plants

NC objectives	Ideas for teaching	Key knowledge and vocabulary
Sc1/2.1a identify and name a variety of common wild and garden plants, including deciduous and evergreen trees	<ul style="list-style-type: none"> Sort trees and plants into groups Match a definition of a tree and a plant Match three deciduous trees to their names Match three evergreen trees to their names Say whether a tree is evergreen or deciduous Can sort six evergreen and deciduous trees Match three common garden plants to their name Match three wild plants to their names Say whether a plant it garden of wild Sort six wild and garden plants into groups 	<p><u>Big idea(s):</u> B2</p> <p><u>Famous Scientist:</u> Beatrix Potter</p> <p><u>Possible Scientific Questions:</u></p> <ul style="list-style-type: none"> Will a seed grow is it is planted upside down? Why do seeds look different? <p><u>Revision</u> energy, habitat <u>New learning and vocabulary</u> component, energy, growth, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower</p> <p>Know a rose bush, a sunflower and a dandelion by sight Know an oak tree, a birch tree and a horse chestnut tree by sight Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn Know that a flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk</p>
Sc1/2.1b identify and describe the basic structure of a variety of common flowering plants, including trees	<ul style="list-style-type: none"> Locate the root, stem, flower head, leaf and petal of plant Can label a garden plant (Word bank) Can label a wild plant (Word bank) Identify a similarity and different from two contrasting plants Observe and identify roots, trunk , twig, branch and leaf Label a tree Identify a similarity and difference from two contrasting trees 	

Year 2

Year 2 – Ongoing throughout year – Working scientifically	
NC objectives	Key knowledge and vocabulary
<p>Sc1/1.1 asking simple questions and recognising that they can be answered in different ways</p> <ul style="list-style-type: none"> Can explore the topic question (To be found with each topic). Making sure you use; pictures, images, real life – Use Explorify) Let children touch explore ask questions. Children to use Postit notes/WB in pairs to ask questions at the start of a topic or lesson. Teacher can discuss a range of these. Can answer with the support of STEM sentences. Can answer with the support of word banks. <p>Sc1/1.2 observing closely, using simple equipment (Observation over time can take place over any period of time.)</p> <ul style="list-style-type: none"> Can observe a whole class investigation ran by an adult. Can observe a small group investigation ran by a peer. Can observe something changing and growing. Can explain what they have seen using displayed scientific vocabulary (relevant to that lesson) Can name a range of scientific equipment (word bank) Can use a range of scientific equipment that will enhance their leaning. Can talk about and use a range of scientific equipment safely. Aide their observations or enquiries by using: <ul style="list-style-type: none"> a magnifying glass - meter sticks - torches - tape measures scales - stop watches -beakers - pipettes - digital microscope <p>Sc1/1.3 performing simple tests (Observe and measure the effect changing one variable has on another whilst keeping all other variables the same. Children may have less control over the variables in a comparative test.</p> <ul style="list-style-type: none"> Can identify the equipment needed for an investigation. Can identify and talk about how to stay safe around the equipment. . Can participate in whole class investigations and offer how to improve the investigation. Can follow 4-5 instructions. Can set up an investigation (small groups) with the help of an adult. <p>Sc1/1.4 identifying and classifying (It involves sorting objects, materials, living things or events into manageable sets using different criteria)</p> <ul style="list-style-type: none"> Can use a Venn diagram with given headings or they suggest the headings. . Can sort 12-17 objects into given headings (may be less depending on the activity). Can draw a picture of their observations with a sentence explaining it. Can use a camera to take a picture – to talk about observations with a partner. Can discuss differences and similarities using adult support. <p>Sc1/1.5 using their observations and ideas to suggest answers to question</p> <p>Sc1/1.6 gathering and recording data to help in answering questions</p> <ul style="list-style-type: none"> Add gathered data from a class investigation to a premade table – chn to add some headings. Add gathered data from a class investigation to a premade pictogram – chn to some labels/titles. Add gathered data from a class investigation to a premade tally chart – chn to add labels/titles. Discuss evidence for their understanding (Using scientific vocabulary) Fill in STEM sentences with word banks Can recognise the vocabulary: biggest, smallest, best, worst from their data – with support. Can suggest appropriate answers using evidence from prior learning (from observations, measurements and secondary sources). <ul style="list-style-type: none"> Record data by: Observational drawings – adding labels and taking photographs. Record measurements by: Pictograms (axis and key given) Children add title. Record classification by: Venn diagrams – headings discussed and decided by the class. 	<p><u>Learning and vocabulary – continuing from year 1</u></p> <p>properties, observe, test, magnifying glass, object, record, equipment</p> <p>Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science</p> <p>Know that we can use magnifying glasses to observe objects closely</p> <p>Know that we can test our questions to see if they are true</p> <p>Know that objects can be identified or sorted into groups based on their observable properties</p> <p>Know that we can write down numbers and words or draw pictures to record what we find.</p> <p>Possible questions to ask:</p> <p>Comparative and fair testing</p> <ul style="list-style-type: none"> Do cress seeds grow quicker inside or outside? Do amphibians have more in common with reptiles or fish? Is there the same level of light in the evergreen wood compared with the deciduous wood? Which shapes make the strongest paper bridge? <p>Observations over time?</p> <ul style="list-style-type: none"> What happens to my bean after I have planted it? How does a tadpole change over time? How much food and drink do I have over a week? Would a paper boat float forever? <p>Pattern Seeking</p> <ul style="list-style-type: none"> Do bigger seeds grow into bigger plants? What conditions do woodlice prefer to live in? Do magnetic materials always conduct electricity? - Which age group of children wash their hands the most in a day? <p>Identifying, classifying and grouping</p> <ul style="list-style-type: none"> Can we identify the trees that we observed on our tree hunt? Which offspring belongs to which animal? How would you group these plants based on what habitat you would find them in? How would you group things to show living, dead and never alive? Which materials are shiny and which are dull? Which materials will let electricity go through them, and which will not? <p>Researching using secondary sources</p> <ul style="list-style-type: none"> How does a cactus survive in a desert with no water? What do you need to do to look after a pet dog/cat/lizard and keep it healthy? What food do you need in a healthy diet and why? How does the habitat of the Arctic compare with the rain forest? How are plastics made? How have the materials we used changed over time?

Year 2 – Autumn 1 and 2 – Uses of everyday materials

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc2/3.1a identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses</p>	<ul style="list-style-type: none"> Name objects from the classroom or outside (pen, sandpit) Name materials from the classroom or outside (wood, plastic) As a class, list properties of materials (durable, strong, fragile etc) Identify the material and properties of a given object. Range of spoons – which is best? Discuss suitability. Give a material, E.G. metal – it is used for a car, table legs, coins and cans. Why is metal most suitable for these? Create a fishing game? Give the children a range of metals, they need to choose the most suitable that they think will be magnetic. 	<p><u>Big idea(s):</u> C1, C2</p> <p><u>Famous scientist -</u> Leo Baekeland</p> <p><u>Revision</u> absorption, matter, property Objects are made from materials such as wood, plastic, glass, metal, water, rock Materials have properties such as being hard, soft, strong, weak, absorbent, heavy, light, solid, runny, smooth and rough; these descriptions denote the properties of a material Matter (stuff) is made from tiny building blocks</p> <p><u>New learning and vocabulary</u> conductor, brick, paper, cardboard, friction, movement, suitability, surface, stretch, twist, waterproof, deformation, flexible, rigid</p>
<p>Sc2/3.1b compare how things move on different surfaces.</p> <p>Sc2/3.1c find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</p>	<ul style="list-style-type: none"> Identify the properties of solid materials (hard, soft, rigid, flexible, smooth and rough) Look at a list of objects (pan, jumper, teddy, brick, sock and fork) can tick the ones that can be stretched and twisted. Look at a list of objects (ruler, spook, plastic wallet, plastic box, straw) can tick the ones that can be squished and bent. Discuss pictures of chocolate and see if they can be changed by squashing, bending, twisting and stretching. Can investigate with a range of chocolates and see if they can change them. Teacher could introduce heat to change the solid's shape by melting. Can be shown pictures of candles/crayons and discuss whether these solids can be changed by squashing, bending, twisting and stretching. Can investigate with a range of candles/crayons and see if they can change them. Teacher could introduce heat to change the solid's shape by melting 	<p>Know that materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid, light or heavy.)</p> <p>Know that many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy.</p> <p>Know that when objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller</p> <p>Know that applying forces to objects can change their shape</p>

Year 2 – Spring 1 and 2 – Living things and life cycles

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc2/2.1a explore and compare the differences between things that are living, dead, and things that have never been alive</p> <p>Sc2/2.1b identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other</p> <p>Sc2/2.1c identify and name a variety of plants and animals in their habitats, including microhabitats</p>	<ul style="list-style-type: none"> • Draw around each other, write/identify what makes them alive (word mat provided) • Compare their picture and reasons to a battery operated dog that walks and barks – are they both living? • Match definitions to the work dead, alive and never alive. • Identify the features of something dead, alive, never alive. • Write short definitions from dead, alive, never alive. • Sort pictures of things that are dead (fossil, leaf, wooden table, paper), alive (sunflower, tree, dog, human, baby), never alive (computer, football, knife, fork, glass, table) • Recap what animals need to survive • Identify that their habitat is a house • What does the habitat have that keeps them alive? • Compare habitats of people (mud house-mansion) • Compare the similarities and differences between needs of survival • Match animals to their habitats (bird – tree, fish – water, lion – desert) • Discuss – ideal habitat for a penguin • Recap what plants need to survive • Sort pictures of good and bad habitats for common garden and wild plants – dark, ocean, plant pot, garden, woodland, rock. • Using a pic/drawing write about what makes a good habitat for a plant (word mat provided) • Name 6 different animal habitats - pond, ocean, rainforest, field, woodland, desert (word mat with pictures provided) • Name 5 features of 4 different animal habitats – Pond, field, ocean, rainforest (word mat provided) • Match animal habitat names to pictures of habitats • Sort pictures of animal habitat features under names of habitat • Describe similarities and differences between 3 animal habitats – pond, ocean and desert / field, woodland and rainforest (word mat provided) 	<p><u>Big idea(s):</u> B1, B3</p> <p><u>Famous Scientist:</u> Rachel Carson</p> <p><u>Revision</u> habitat, growth, absorption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, herbivore, carnivore, omnivore</p> <p>Dandelions, rose bushes, grass, ash trees, birch trees and conifers trees are examples of plants. Trees can be deciduous or evergreen. A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal Herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants</p> <p><u>New learning and vocabulary</u> birth, decay, energy, microhabitat, dead, life cycle, food chain, source, nutrients, reproduction, consumption, environment</p> <p>Know that living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things. Know that polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice. Know that sharks are another example – smooth skin and streamlined shape for quick swimming; and gills for breathing underwater Know that cacti are an example of a plant adapted to its environment – thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water Know that pine trees have thick bark and pine cones to protect against cold winters Know that woodlice live under logs – an example of a microhabitat - as they need somewhere dark and damp so that they do not dry out Know that frogs can live in ponds – an example of a microhabitat - as they water in which to lay their eggs (frogspawn) Know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals. Know that the arrows on a food chain show the direction that the energy travels.</p>

Sc2/2.1d describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.

- Using pictures, name animals in their habitats - using pictures, match animals to their habitats (12 animals with 4 habitats)
- Locate microhabitats in environment - Take photographs of microhabitats and label 4 features
- Describe 5 main features of a microhabitat (word mat with pictures provided)
- Name 6 animals found in a microhabitat
- Compare similarities and differences between larger habitats and microhabitats.
- Name 6 different plant habitats - woodland, desert, rainforest, ocean (word mat with pictures provided)
- Match names of plant habitats to 6 pictures
- Sort pictures of plant habitats under names of plant habitats
- Name 4 features of 5 different plant habitats – woodland, rainforest, ocean
- Describe similarities and differences between 3 plant habitats - woodland and rainforest / desert and ocean
- Using pictures, name plants in their habitats
- Using pictures, match plants to their habitats (12 plants with 4 habitats)
- Sort 9 food pictures that are eaten by a herbivore, carnivore and omnivore.
- From prior lessons, name animals that are herbivores, carnivores and omnivores.
- Using food items, children sort those that are from plant and those that are from animal.
- Create a meal that has food from plant and animal
- Sort 8 animals into groups names 'prey' and 'predator'
- Match definitions to words 'prey' and 'predator'
- Order 3 pictures of animals into a food chain. E.g. caterpillar, bird, cat
- Name what an animal eats and what eats it. E.g. Spider. Spiders eat flies. Birds eat spiders.
- Create a food chain that includes a human
- Discuss what would happen if an organism was removed from a food chain. E.g grass

Year 2 – Summer 1 and 2 – Plants and Animals including humans

NC objectives	Ideas for teaching	Key knowledge and vocabulary
Sc2/2.2a observe and describe how seeds and bulbs grow into mature plants	<ul style="list-style-type: none"> Verbally sequence observations from seed growing video. Verbally sequence observations from bulb growing video. Can plant a seed individually and make daily observations. Can plant a bulb as a class and make daily observations. Can sequence the growing process of a seed (pictures provided) and write a description of what is happening in each stage. (Word bank provided if needed) Can sequence the growing process of a bulb (pictures provided) and write a description of what is happening in each stage. (Word bank provided if needed) 	<p><u>Big idea(s):</u> B1</p> <p><u>Famous Scientist:</u> Marie Clark Taylor (Plants) Dr Kelly Blacklock (animals)</p> <p><u>Revision</u> growth, habitat, nutrients, consumption</p>
Sc2/2.2b find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	<ul style="list-style-type: none"> Can identify things that will help plants grow and stay healthy (list of items) Using four contrasting pictures of plant growing conditions. Can say which one will grow the most, grow the least and stay healthy. Can describe the impact of extreme conditions. (Too hot, too much water) Whole class investigation to help understanding. 	<p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p><u>New learning and vocabulary</u> reproduction, offspring, adult, bulb, seed, survival, temperature, hygiene, exercise</p>
Sc2/2.3a notice that animals, including humans, have offspring which grow into adults	<ul style="list-style-type: none"> Can name animals and their offspring (use a word bank to help some children) Can sequence the growth of animals, inc humans (using 5 pictures – birth, child, teenager, adult, elderly). Identify difference between two species (smaller animals may not live as long) 	<p>Know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth)</p> <p>Know that plants that are deprived of light, food or air will not grow and will die.</p> <p>Know that plants and animals produced offspring that grow into adults.</p>
Sc2/2.3b find out about and describe the basic needs of animals, including humans, for survival (water, food and air)	<ul style="list-style-type: none"> Match the needs of humans to the reasons (Food – fuel. Sleep – Recover) Match the needs of animals to the reasons (Food – fuel. Sleep – Recover) Identify what humans need to survive from a provide selection and give reasons. Identify what animals need to survive from a provide selection and give reasons. 	<p>Know that animals, including humans, need food, water and air to survive</p> <p>Know the basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods</p> <p>Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables</p>
Sc2/2.3c describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	<ul style="list-style-type: none"> Identify benefits of exercise in general (Heart rate, healthy, mental state, sleep). Can sort 8 healthy and unhealthy food into groups from pictures or packages. Can pick the healthy food out of a given 6 items to create a meal. Plan a day of healthy meals. Can make a healthy meal. Can identify the right amount to eat using a healthy eating plate (do not need to look into categories) Looking at the daily routine identify hygiene (toilet, bath, shower, washing hand, brushing teeth). Using tissues for coughing and sneezing. Sequence the day. Consider using the milk and pepper investigation. Define why we should eat or do activities (Eat an apple – what benefit) Select healthy choices and explain reasoning behind choices from pictures of healthy and unhealthy food or activities. 	<p>Know that fats and sugary foods should be eaten rarely and in small amounts</p> <p>Know that people need to exercise often to help their body stay strong and fit</p> <p>Know that keeping clean, including washing and brushing teeth, is an important part of staying healthy</p>

Year 3

Year 3 – Ongoing throughout year – Working scientifically	
NC objectives	Key knowledge and vocabulary
<p>Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them</p> <ul style="list-style-type: none"> Explore the topic question Ask additional questions to develop their understanding Answer with the support of word banks through a range of scientific enquires <p>Sc4/1.2 setting up simple practical enquiries, comparative and fair tests</p> <ul style="list-style-type: none"> Can gather equipment needed for an investigation Can identify and explain how to stay safe around a scientific investigation. Can, in small groups, help set up an investigation. Can participate in small groups investigations – taking turns. Can offer suggestions to improve investigations Can follow a procedure. <p>Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</p> <ul style="list-style-type: none"> Can identify patterns through observations of data (temperature and measurement). Teacher to support with scientific vocabulary and modelled answers. To use a range of thermometers, scales and measuring jugs with support to read the scales. To take accurate readings from the above with support. (Ensure you make sure that lessons or steps are taking so that chn understand how to do this – don't just expect it) Aide their observations or enquiries by using: <ul style="list-style-type: none"> a magnifying glass - meter sticks -torches -tape measures -scales -stop watches - beakers -pipettes -digital microscopes -thermometers (Support) -data loggers (Support) <p>Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering question</p> <p>Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</p> <ul style="list-style-type: none"> Record data by: To draw a scientific diagram with at least 2-3 scientific labels (Word bank) <ul style="list-style-type: none"> Observational drawings Record measurements by: Create a simple pictogram – pre-drawn axis. <ul style="list-style-type: none"> Use premade axis for a bar chart with children adding scales, labels and data. To create a table independently – add date gathered. To have modelled example for children to use. Record classification by: Venn diagrams (support to discuss) 	<p><u>Revision</u> properties, observe, test, magnifying glass, object, record, equipment</p> <p>Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science Know that we can use magnifying glasses to observe objects closely Know that we can test our questions to see if they are true Know that objects can be identified or sorted into groups based on their observable properties Know that we can write down numbers and words or draw pictures to record what we find</p> <p><u>New learning and vocabulary</u> prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis</p> <p>Know that we can ask questions and answer them by setting up scientific enquiries Know how to make relevant predictions that will be tested in a scientific enquiry Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry</p> <p>Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true</p>

<p>Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</p> <ul style="list-style-type: none"> • Create a conclusion/presentation as a class, orally, with the support of T. • Create a conclusion/presentation as a class, written, with the support of T. • Can, with a word bank or the help of STEM sentences, conclude on their findings orally. • Can, with a word bank or the help of STEM sentences, conclude on their findings written. • Present through formal investigation, written, orally, drawings, PowerPoints • Use knowledge of the investigation, data gathered and conclusion to support in creating a new investigation using a prediction. <p>Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes</p> <ul style="list-style-type: none"> • Make simple comparisons between two investigations/ideas (Verbally). • Make simple comparisons between two investigations/ideas (STEM sentences). <p>Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings.</p> <ul style="list-style-type: none"> • Can, as a class, after an investigation can use their data to support the topics question. • Can after an investigation can use their data to support the topics question. • Can use further reading and research to support their findings. 	<p>Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry</p> <p>Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)</p> <p>Know that they can draw conclusions from the findings of other scientists</p> <p>Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry</p> <p>Possible questions to ask:</p> <p>Comparative and fair testing</p> <ul style="list-style-type: none"> - Which conditions help seeds germinate faster? - How does the skull circumference of a girl compare with that of a boy? - Which magnet is the strongest? - Which surface is best to stop you slipping? <p>Observations over time?</p> <ul style="list-style-type: none"> - What happens to celery when it is left in a glass of coloured water? - How do flowers in a vase change over time? - How does tumbling change a rock over time? - What happens when water keeps dripping on a sandcastle? - Is the Sun the same brightness all day? <p>Pattern Seeking</p> <ul style="list-style-type: none"> - What colour flowers do pollinating insects prefer? - Do male humans have larger skulls than female humans? - Is there a pattern in where we find volcanos on planet Earth? - Are you more likely to have had bad eyesight and to wear glasses if you are older? - Does the size and shape of a magnet affect how strong it is? <p>Identifying, classifying and grouping</p> <ul style="list-style-type: none"> - How many different ways can you group our seed collection? - How do the skeletons of different animals compare? - Can you use the identification key to find out the name of each of the rocks in your collection? - How would you organize these light sources into natural and artificial sources? - How can we group the food that we eat? - Which materials are magnetic? <p>Researching using secondary sources</p> <ul style="list-style-type: none"> - What are all the different ways that seeds disperse? - Why do different types of vitamins keep us healthy and which foods can we find them in? - Who was Mary Anning and what did she discover? - How does the Sun make light? - How have our ideas about forces changed over times? - How does a computer work?
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Year 3 – Spring Term 1 and 2 - Light

NC objectives	Ideas for teaching	Key knowledge and vocabulary
Sc3/4.1a recognise that they need light in order to see things and that dark is the absence of light	<ul style="list-style-type: none"> Identify light sources around them. Sort pictures into natural, man-made or not a light sources or not (makes sure to include the moon in this and a reflection of a hi-vis jacket) Define the term light source (word bank) Experience what they can see in a range of environments (The classroom, woodland, cupboard and under desk with a blanket over the top) Explain (word bank) what dark is. Identify that it is harder to see objects in the dark – could use a feely bag investigations where they need to try and describe it without seeing it. Explain their thoughts around light and dark by filling the missing key vocabulary from a pre-written conclusion. 	<p><u>Big idea(s):</u> P1, P3</p> <p><u>Famous scientist</u> – Isaac Newton</p> <p><u>Revision</u> absorption, energy, property, reflection</p> <p><u>New learning and vocabulary</u> wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger</p> <p>Know that light is a form of energy Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another Know that we need light to see things and that darkness is the absence of light Know that light travels in straight lines Know that light is reflected when it travels from a light source and then 'bounces' off an object Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun Know that many light sources give off light and heat Know that the Sun gives off light and heat when hydrogen turns into helium Know that filaments in traditional bulbs heat up until they glow, giving off light and heat Know that fluorescent bulbs glow when electricity adds energy to a gas within the bulb</p>
Sc3/4.1b notice that light is reflected from surfaces	<ul style="list-style-type: none"> Understand and define the term reflection (word bank). Sort 8 materials into reflective and not. Identify the best reflective materials and explain your reasoning (word bank). Design a reflective item for a Badger. Make the item and test the item. 	
Sc3/4.1c recognise that light from the Sun can be dangerous and that there are ways to protect their eyes	<ul style="list-style-type: none"> Identify the dangers of the sun (group activity) Sort appropriate clothing/items that will help protect them from the sun. Set up an investigation using UV beads (could have them out with no sunglasses, with cheap sunglasses and with UV protection sunglasses. Conclude their findings using premade definitions and word banks. Research and create a warning poster about the dangers of the sun including how to keep us safe. 	

<p>Sc3/4.1d recognise that shadows are formed when the light from a light source is blocked by a solid object</p> <p>Sc3/4.1e find patterns in the way that the size of shadows change.</p>	<ul style="list-style-type: none"> • Match the definitions to the terms: Opaque, transparent and translucent. • Group 10 items in the headings: Opaque, transparent and translucent. • Sort objects into groups that would either make a shadow or wouldn't (Glass, book, ball, glass bottle and coloured glass bottle and tracing paper) • Investigate, using a puppet, the effects of the opaque object and the shadow that it casts. • Explain the reasons why this happens (word bank or premade conclusion with gaps missing) <ul style="list-style-type: none"> • Recap prior objective. • Identify an opaque, transparent and translucent object from a given 15. • Identify what objects you need to make a shadow. • Use prior puppet to explore how to make the shadow change size without changing the size of the puppet. • Conclude their findings. 	<p>Know that sunglasses can protect eyes from sunlight but looking at the Sun directly – even with sunglasses – can damage the eyes</p> <p>Know that opaque objects block light creating shadows and that light passes through transparent objects</p> <p>Know that opacity/transparency and reflectiveness are properties of a material</p> <p>Know that as objects move towards a light source, the size of the shadow increases</p> <p>Know how to show the changing of shadow size by drawing a diagram with straight lines representing light</p> <p>Know that a data logger can keep track of light levels and that this can be plotted on a graph to show how this changes over the course of a day</p> <p>(NB: the Sun and the Moon are capitalized when being discussed in an astronomical context.)</p>
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Year 3 – Autumn 1 – Rocks and Fossils		
NC objectives	Ideas for teaching	Key knowledge and vocabulary
Sc3/3.1a compare and group together different kinds of rocks on the basis of their appearance and simple physical properties	<ul style="list-style-type: none"> • Discuss what rocks are. • Identify rocks in 6 different pictures. • Identify the three types of rocks. • Match the features of the three types of rocks (these given by the teacher) to the name and pictures of the rock. • Match the 9 rocks to the heading natural and man-made. • Compare the suitability of rocks (e.g. we can't build a house out of chalk or diamond) • Describe rocks using a word bank of adjectives to describe their appearance (soft, rough, hard, crumble, yellow, white) • Group the rocks based on their physical properties (hard, soft, permeable, impermeable, durable, density) to group rocks. • Have a carousel of activities – 1. Test permeability and durability. 2. Research using books. 3. Test density (test the buoyancy) • Make chocolate rocks. 	<p>Big idea(s): C1, C2, C3, E3</p> <p>Famous scientist : Mary Anning</p> <p>Revision decay, matter, melting, material,</p> <p>Rock is a type of solid material.</p> <p><u>New learning and vocabulary</u> extinction, igneous, metamorphic, sedimentary, paleontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil</p>
Sc3/3.1b describe in simple terms how fossils are formed when things that have lived are trapped within rock	<ul style="list-style-type: none"> • Discuss whether dinosaurs on real. Discuss the knowledge around dinosaurs are based around the information shared by p Paleontology • Know the difference between bones and fossils. • Order the process of fossilisation using a range of pictures. • Match the statements (process of fossilisation) to the picture. • Can be shown 3 pictures of fossilised organisms – can discuss what they think the organism used to be. • Make chocolate fossils. 	<p>Know that there are three kinds of rocks: igneous, sedimentary and metamorphic</p> <p>Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath</p> <p>Know that granite and basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust</p> <p>Know that limestone and sandstone are types of sedimentary rock which form when small, weathered fragments of rock or shell settle and stick together, often in layers</p>
Sc3/3.1c recognise that soils are made from rocks and organic matter.	<ul style="list-style-type: none"> • Identify what a soil is. • Research how soil is made. • Identify the layers of the soil (bottom to top: Solid Rock, Weathered or decomposed (Parent Material), Subsoil, Topsoil, Organic Materials) • Identify that soil is made up of air, water, mineral. Organic matter. • Identify the four main process in soil formation: Additions, losses, translocations and transformation. • Match the features of each soil formation to the name and picture. • Create their own compost in a bottle, group activity. 	<p>Know that marble and slate are types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other</p> <p>Know that fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there</p> <p>Know that soil is made from tiny particles of rock broken down by the action of weather (weathering)</p>

Year 3 – Autumn 2 – Forces and Magnets

NC objectives	Ideas for teaching	Key knowledge and vocabulary
Sc3/4.2a compare how things move on different surfaces	<ul style="list-style-type: none"> Discuss how things move with given vocabulary. Discuss the term friction. Use a range of objects (Shoes, car, ball and book) on a range of surfaces (table, carpet, pavement, sand and grass) Investigate which surface is best for each object. Use a word bank to help explain their findings. 	<p><u>Big idea(s)</u>: P2</p> <p><u>Famous Scientist</u> : William Gilbert</p> <p><u>Revision</u> energy, matter, property, wave, metal, material, surface, friction, force, stretch, squash, rough, smooth</p>
Sc3/4.2b notice that some forces need contact between 2 objects, but magnetic forces can act at a distance	<ul style="list-style-type: none"> Using above experiment, can discuss, in the class, how objects move. Open a door and explain how it moved. Can ride a scooter and explain how it moved. Teacher to question and dig for the chn to explain that they need a push and pull force for things to move. Move around the school, inside and out to find 10 things/objects that require a push or pull force. Identify 4 similarities and differences with the 10 things/objects found. Give children a magnet and paper clip to investigate forces. Use a word bank to explain that magnets can work at a distance. Explain though, that if given a magnet and paper clip they do not always need contact. 	<p>Metal is a material from which objects can be made. As objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller. Applying forces to objects can change their shape. Know that the roughness of a material is an example of a property</p>
Sc3/4.2c observe how magnets attract or repel each other and attract some materials and not others	<ul style="list-style-type: none"> Understand and explain the term repel. Understand and explain the term attract. Investigate with two magnets what happens when held differently 	<p><u>New learning and vocabulary</u> magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion</p>
Sc3/4.2d compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials	<ul style="list-style-type: none"> Explore the terms North and South pole when explaining the reaction of the magnets (word bank or definitions given). Explore and group together a range of 20 objects and sort into magnetic and non-magnetic groups. Explain with a word bank the finding. Explore and group together a range of 20 objects that are metal and sort into magnetic and non-magnetic groups. Explain with a word bank the finding. May need to tell the chn about the specific metals that makes it magnetic. Compare coins from different years – some will be magnetic and some won't. Compare a range of keys – are they all magnetic? (Iron keys will) 	<p>Know that a force can be thought of as a push or a pull Know that there are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed). Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves Know that there are also non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force Know that magnets have two poles called north and south Know that like poles (south-south and north-north) of two magnets repel each other and that opposite poles of two magnets (north-south) attract each other Know that there is a magnetic field around a magnet which is strongest at each pole Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic</p>

<p>Sc3/4.2e describe magnets as having 2 poles</p> <p>Sc3/4.2f predict whether 2 magnets will attract or repel each other, depending on which poles are facing.</p>	<ul style="list-style-type: none"> • Can investigate with 4 different magnets and describe what happens when held differently • Can describe whether they act in the same way. • Can explore the terms North and South pole when explaining the reaction of the magnets. • Can predict using prior knowledge what will happen in a series of event (N-N, S-S, N-S, S-N) 	
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Year 3 – Summer 1 and 2 – Plants and Animals including Humans

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc3/2.1a identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</p> <p>Sc3/2.1b explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant</p> <p>Sc3/2.1c investigate the way in which water is transported within plants</p> <p>Sc3/2.1d explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p>	<ul style="list-style-type: none"> Dissect a plant or flower. Can label the parts using their prior knowledge (word bank) Can match the function to the given part of the plant (description provided including the roots, stem, leaves and flower). Can identify what plants need to grow and stay healthy (see Year 2) Can identify what plants need to grow and stay healthy (air, light, water, nutrients from soil and room to grow.) Can explore and compare the growth of a tomato plant, a cactus plant, and cress when grown in sand and compost. Can explore and compare the growth of onions in the same size pot but with more bulbs. (pot 1 – 2 bulbs, pot 2 – 3 bulbs and pot 3 – 4 bulbs) Can identify how the needs change from plant to plant. Can predict from three pictures which plant will grow the most (more water, less sun light, less room etc). Identify the part of the plant that transports the water. Sequence the transportation of how the water travels through a plant (to use pictures and descriptions provided) Investigate how water travels (White Carnations or celery in coloured water) Predict and give reasons to what might happen to a plant without roots and a plant with roots. (word bank) Sequence the life cycle of a plant (word bank) Can identify the parts of the flower that are responsible for reproduction (pictures and a choice of two). Video of the sexual reproduction in plants. Can order the sexual reproduction in plants using pictures and a definition. Identify animals which help pollination. (Give a choice of two) Identify the weather that helps pollination. (Give a choice of two) 	<p><u>Big idea(s):</u> B1, B2, B3</p> <p><u>Famous Scientist</u> Dr Kelsey Byers (Plants) <u>Famous Scientist</u> Yann e Meur (Animals)</p> <p><u>Revision</u> component, energy, growth, habitat, reproduction, decay, offspring, adult, bulb, seed, survival, temperature nutrients, consumption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, vertebrate, skeleton</p> <p>Evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn Flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things. Plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals. Seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth) The arrows on a food chain show the direction that the energy travels. Plants that are deprived of light, food or air will not grow and will die. Animals, including humans, need food, water and air to survive There are food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods More than half of our diet should be made up of carbohydrates, fruit and vegetables Fats and sugary foods should be eaten rarely and in small amounts</p> <p><u>New learning and vocabulary</u> extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect</p> <p>Know that different parts of plants have one or more functions (jobs) Know that the roots collect water and minerals from the soil, and hold the plant firmly in the ground Know that the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; know that the stem also transports water and minerals from the roots to the other parts of the plant Know that the leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates Know that the function of a flower is reproduction, where flowers of the same kind exchange pollen – made by an anther – in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal</p>

<p>Sc3/2.2a identify that animals, including humans, need the right types and amount of nutrition, and</p> <p>that they cannot make their own food; they get nutrition from what they eat</p>	<ul style="list-style-type: none"> • Can sort 10 healthy and unhealthy food into groups from pictures or packages. • Can pick the healthy food out of a given 10 items to create a meal. • Can give an explanation about why they have chosen the above foods. • Can research the food groups (teacher to give word bank) • Can classify 2 food groups (Meat and dairy) • Can classify all nutrient with prior input from teacher (definition provided) • Can identify 2 nutrition groups on a healthy eating plate (Protein and dairy) • Can identify all nutrient groups on a healthy eating plate with prior input from teacher (Definition provided). • To compare 2 specific foods with their nutrition (tomatoes and their sugar content or cheese with their fat content) • Can compare and contrast the diet of 2 different animals. • Can group 6 animals according to what they eat (herbivore, omnivore, carnivore) • Can compare and contrast the diet of 2 different people (body builder and a long distance runner). • To identify the benefits of eating E.G protein to repair muscles • Define why we should eat (Eat an apple – what benefit) • Can explain the benefits of eating. • Can explain the disadvantages of eating. • Can explain the disadvantages of over eating. • Can explain the disadvantages of undereating. 	<p>Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth)</p> <p>Know that getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet</p> <p>Know that lack of a nutrient can cause ill health; for example, a lack of vitamin D leads to a disease called rickets</p> <p>Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar</p> <p>NB – some food groups are difficult to afford for some families so sensitivity is required in teaching this area</p> <p>Know that excess fat from fatty foods such as butter and cheese - and created in the body from excess calories – builds up in the body and can cause obesity</p> <p>Know that excess body fat can lead to heart disease and increases the strain on joints and growing bones</p> <p>Know that animals, including humans, have a skeleton made up of solid objects.</p> <p>Know that some animals (such as insects) have an exoskeleton – a solid covering on the outside of their body</p> <p>Know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which act like a skeleton</p> <p>Know that skeletons provide support for muscles and protect the body; for example, the ribcage protects the vital organs in the human body</p> <p>Know that human skeletons are made up of bones and cartilage</p> <p>Know that muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens</p>
<p>Sc3/2.2b identify that humans and some other animals have skeletons</p>	<ul style="list-style-type: none"> • Can identify the main body parts (arms, legs, back, chest, head, knee, ankle, wrist, elbow, shoulder, neck) • Can link main body parts (arm, head, back, legs, shoulder, foot) to a picture/area of a Skeleton (arm – chn would point to the part on the Skeleton. • Can label parts of the skeleton (word bank) • Can identify and discuss why we have certain bones (definitions given) • Can identify why we have ball and socket/hinge/gliding joints. (Word bank and definitions given) • Can identify that the human skeleton is a vertebrate, what makes it that? • Can identify that other pictures (4) are vertebrates or invertebrates (e.g. worm) • Can group pictures (2) based on if they are a vertebrates or invertebrates. (Butterfly, Jellyfish, Fish, Dinosaur, Dog) • Can identify the different skeleton types (word bank, pictures and definition given) Endoskeleton, Exoskeleton, Hydrostatic Skeleton. • Can group/sort/classify the pictures (Endoskeletons – elephant, human, mouse. Exoskeletons – Spider, Crab, beetle, Scorpion. Hydrostatic – Slugs, Jellyfish, worm) 	

<p>and muscles for support, protection and movement</p>	<ul style="list-style-type: none"> • Can understand that skeletons protect your body and enable us to move. • Can identify that the body has muscles as well as skeletons. • Can identify the two types of muscles (skeleton muscles and organ muscles) • Can match/link pictures of muscles to the word skeleton muscles (voluntary) (Pecks, gluts, abs) • Can match/link pictures of muscles to work organ muscles (involuntary) (Bowel, heart and blood vessels) • Can discuss the importance of muscles for movement in the aid fine and gross motor skill (class discussion) • Can identify the need of muscles to protect bones, joints and organs in the body. • Can discuss that the core muscle abdomen, back and pelvis help stabilize the body. Can discuss what would happen without muscles and bones. 	
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Year 4

Year 4 – Ongoing throughout year – Working scientifically	
NC objectives	Key knowledge and vocabulary
<p>Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them</p> <ul style="list-style-type: none"> Can explore the topic question (To be found with each topic). Making sure you use; pictures, images, real life – Use Explorify) Let children touch explore ask questions. Children to be given the opportunity at least once per topic to ask questions around their learning and understanding. Can respond to their understanding using their prior knowledge and scientific vocabulary. Can create word banks to aide with answering questions. <p>Sc4/1.2 setting up simple practical enquiries, comparative and fair tests</p> <ul style="list-style-type: none"> Can gather equipment needed for an investigation Can identify and explain how to stay safe around a scientific investigation. Can, in small groups, help set up an investigation. Can participate in small groups investigations – taking turns. Can offer suggestions to improve investigations Can follow a 4-step procedure. <p>Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</p> <ul style="list-style-type: none"> Can independently identify patterns through observations of data (temperature and measurement) To use equipment for measuring length, time, temperature and capacity. To use standard units of measure (G, KG, CM, M, KM, ML, L) To take precise and accurate readings from the above Aide their observations or enquiries by using: <ul style="list-style-type: none"> a magnifying glass -meter sticks -torches -tape measures -scales stop watches -beakers -pipettes -digital microscopes -thermometers data loggers. <p>Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering question</p> <p>Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</p> <ul style="list-style-type: none"> Record data by: <ul style="list-style-type: none"> Can draw a scientific diagram with at least 4-5 scientific labels (word bank) Use a variety of photographs, videos, pictures, labelled diagrams or writing to record their observations. Record measurements using: <ul style="list-style-type: none"> Independently create a pictogram – support data with a key. Add axis, scales, labels and data for a bar chart. Independently create tables to gather data and use for bar charts and pictograms. Record classification by: <ul style="list-style-type: none"> Venn diagrams (Independently) Classification keys (Support) Start to talk, with support, about the most appropriate way to record data. 	<p><u>Revision</u> properties, observe, test, magnifying glass, object, record, equipment</p> <p>Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science Know that we can use magnifying glasses to observe objects closely Know that we can test our questions to see if they are true Know that objects can be identified or sorted into groups based on their observable properties Know that we can write down numbers and words or draw pictures to record what we find</p> <p><u>New learning and vocabulary – ongoing from year 3</u> prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis</p> <p>Know that we can ask questions and answer them by setting up scientific enquiries Know how to make relevant predictions that will be tested in a scientific enquiry Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table Know how – with structured guidance - to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc) Know that they can draw conclusions from the findings of other scientists Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry</p> <p>Possible questions to ask: Comparative and fair testing</p> <ul style="list-style-type: none"> How does the average temperature of the pond water change in each season? In our class, are omnivores taller than vegetarians? Does sea water evaporate quicker then freshwater? Which material is best to use for muffling sound in ear defenders? Are two ears better than one? How does the thickness of a conducting material affect how bright the lamp is?

<p>Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</p> <ul style="list-style-type: none"> • Create a conclusion/presentation as a class, orally, with the support of T. • Create a conclusion/presentation as a class, written, with the support of T. • Can, with a word bank or the help of STEM sentences, conclude on their findings orally. • Can, with a word bank or the help of STEM sentences, conclude on their findings written. • Present through formal investigation, written, orally, drawings, PowerPoints • Use knowledge of the investigation, data gathered and conclusion to support in creating a new investigation using a prediction. <p>Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes</p> <ul style="list-style-type: none"> • Make simple comparisons between two investigations/ideas (Verbally). • Make simple comparisons between two investigations/ideas (STEM sentences). <p>Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings.</p> <ul style="list-style-type: none"> • Can, as a class, after an investigation can use their data to support the topics question. • Can after an investigation can use their data to support the topics question. • Can use further reading and research to support their findings. 	<p>Observations over time?</p> <ul style="list-style-type: none"> - How does the variety of invertebrates on the school field change over the year? - How does an egg shell change when it is left on cola? - Which material is best for keeping our hot chocolate warm? - How does the mass of an ice cube change over time? - How long does a battery light a torch for? <p>Pattern Seeking</p> <ul style="list-style-type: none"> - How has the use of insecticides affected bee pollination? - Are foods that are high in energy always high in sugar? - Is there a pattern in how long it takes different sized ice-llies to melt? - Is there a link between how loud it is in school and the time of day? If there is a pattern, is it the same in every area of the school? - Which room have the most electrical sockets in a house? <p>Identifying, classifying and grouping</p> <ul style="list-style-type: none"> - What are the names for all the organs involved in the digestive system? - How can we organize teeth into groups? - Can you group these materials and objects into solid, liquid and gasses? - Can we use the classification keys to identify all the animals that we caught pond dipping? - How would you group these electrical devices based on where the electricity comes from? <p>Researching using secondary sources</p> <ul style="list-style-type: none"> - Why are people cutting down the rainforest and what effect does that have? - How do dentists fix broken teeth? - What are hurricanes, and why do they happen? - How has electricity changed the way we live? - How does a light bulb work? - Do all animals have the same hearing range?
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Year 4 – Autumn 1 – Animals including humans

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc4/2.2a describe the simple functions of the basic parts of the digestive system in humans</p> <p>Sc4/2.2b identify the different types of teeth in humans and their simple functions</p> <p>Sc4/2.2c construct and interpret a variety of food chains, identifying producers, predators and prey.</p>	<ul style="list-style-type: none"> Can label the digestive functions to a part of the body (Mouth, oesophagus, tongue, teeth, salivary gland, stomach, liver, small intestine, large intestine, gall bladder) Can be given brief definitions, expanded on them and match them to the function. Describe the functions of 6 parts of the digestive system. Can participate in a practical activity to demonstrate how the digestive system works. Can identify we have milk teeth as babies. Can identify when we lose teeth we grow adult teeth. To name the 4 types of teeth and identify which is which (this should be a recap from prior year groups) To write the definitions of the types of teeth to the name or the tooth (using a word bank) Research (using ICT) how teeth help us with digestion. Research (using ICT) how the tongue helps with digestion. Observe pictures of different types of teeth. Discuss as a class/groups how and why you think this has happened. Group the pictures of pictures of teeth (healthy, unhealthy, both) Practical activity of eggs in different liquids – investigate and observe the damage to the egg. The shell represent the enamel. Can recap herbivores, omnivores, carnivores. Can discuss and understand the term scavenger. Can match the definition of prey, producer, consumer and predator to the names. Can sort pictures of animals into groups of prey, predator, producer and consumer. Can link and match the terms prey, producers, consumer, and predator to herbivores, omnivores and carnivores. Can sort 4 animals into a food chain (grass, rabbit, fox) 	<p><u>Big idea(s):</u> B3</p> <p><u>Famous Scientist:</u> Ivan Pavlov or Jill Robinson</p> <p><u>Revision</u> absorption, component, dissolving, energy, nutrients, consumption, hygiene, herbivore, carnivore, organ</p> <p>Proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth) A food group can cause ill health, such as tooth decay due to excess sugar Living things move, grow, consume nutrients and reproduce Plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.</p> <p><u>New learning and vocabulary</u> digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, esophagus, tongue, saliva, acid, bile, enzymes, incisors, canines, molars, predator, prey, producer, consumer, primary, secondary, tertiary</p> <p>Know that food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion Know that the process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body Know that the process of digestion begins with food being chewed in the mouth by the teeth and saliva added Know that a human has three types of teeth – incisors, canines and molars – and that these each perform different functions Know that incisors slice food, canines tear food (especially meat) and that molars grind food Know that children develop an initial set of teeth which are gradually replaced between the ages of 6 and 12 Know that food is squeezed down the esophagus towards the stomach in a wave-like action called peristalsis Know that the stomach releases acid and enzymes to continue breaking down the food; the stomach is an organ; an organ is a part of living thing that is self-contained and has a specific important job Know that further enzymes and bile break down the food further as it moves through the duodenum towards the small intestine Know that the small intestine adds more enzymes and then absorbs the nutrients Know that the large intestine absorbs water from the undigested food Know that undigested food is stored in the rectum before being excreted through a muscle called the anus</p>

	<ul style="list-style-type: none"> • Can sort 4 animals into a food chain (algae, shrimp, shark) • Can sort pictures (to be given pictures of 15 animals) children sort them into at least 3 food chains with 3 to 4 animals in each. 	<p>Know that a food chain traces the path of energy through a habitat</p> <p>Know that all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants which are called producers</p> <p>Know that consumers take in energy by eating</p> <p>Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator</p> <p>Know that the first consumer in a food chain is called a primary consumer, the second is called a secondary consumer and above it is called a tertiary consumer</p> <p>Know that the arrows in a food chain show the direction that energy is travelling through a habitat</p>
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Year 4 – Autumn 2 – Sound

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc4/4.1a identify how sounds are made, associating some of them with something vibrating</p> <p>Sc4/4.1d find patterns between the volume of a sound and the strength of the vibrations that produced it.</p>	<ul style="list-style-type: none"> Can investigate with a range of instruments (tuning forks, boom whackers, triangles, xylophone) Can discuss how these work using a word bank. Can look at hitting tuning forks, and placing them in water to see the vibrations. Can discuss what has happened and why it has happened. Can investigate this themselves with different sized tuning forks. Can fill in STEM sentences using a word bank to conclude their findings. Can make links between rice on a drum of speaker – can identify that the louder the sound the higher the rise will move. Can make a harmonica (lollypop sticks) can see the vibrations. Can move the straws and it will change pitch. 	<p><u>Big idea(s)</u>: P1, P3</p> <p><u>Famous Scientist</u>: Alexander Graham Bell</p> <p><u>Revision</u> absorption, conductor, energy, insulator, wave</p> <p>Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another</p> <p><u>New learning and vocabulary</u> particle, vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum</p> <p>Know that sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move</p> <p>Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another</p> <p>Know that sound is a form of energy that transfers in a longitudinal wave - like that seen in a slinky - <u>not</u> a transverse wave - like that seen in water ripples</p> <p>Know that sound travels through a medium (e.g. particles in the air) and thus sounds does <u>not</u> travel through a vacuum which has no particles in it at all</p> <p>Know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear</p> <p>Know that sound travels at different speeds through different objects; it travels at around 340 metres per second in air, much slower than light travels; this is why we often hear thunder <u>after</u> we see lightning as the light reaches our eye before the sound reaches our ears</p> <p>Know that pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made by the vibrating object; the number of vibrations per second is called frequency</p> <p>Know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave (e.g. from how hard or soft a percussion instrument is hit)</p> <p>Know that the volume of a sound is quieter if the listener is further away from the object</p>
<p>Sc4/4.1b recognise that vibrations from sounds travel through a medium to the ear</p>	<ul style="list-style-type: none"> Can sequence the movement of sound to your ear. Can match the part of the ear to a name. Can match the name to its function. Can set up an investigation looking at the best material for an ear muff to insulate against sound. Can set up an investigation to make a string telephone. Can investigate whether it still works if it touches another surface (Another telephone string or table leg) Can investigate if you can hear using the telephone around corners. Can investigate the best position to talk to someone (facing each other or backs to each other etc) 	

<p>Sc4/4.1c find patterns between the pitch of a sound and features of the object that produced it</p>	<ul style="list-style-type: none"> • Can investigate using a range of musical instruments (including string, percussion, wood wind) and body percussion to identify that they make different sounds. • Can identify that they are classed as high and low pitched with the support of class discussion. • Can then group/sort given instruments into high and low pitched sounds. • Can set up stations around the class (table with recorders, pitch forks, guitar) can discuss or investigate how to change the pitch of these. • Can make some links to the size of the strings, the tightness of the strings, recorder column. • Can fill in STEM sentences with a word bank to aid their conclusion. • Can, with support, set up an experiment Water xylophones to investigate pitch) 	
<p>Sc4/4.1e recognise that sounds get fainter as the distance from the sound source increases</p>	<ul style="list-style-type: none"> • Can recap the key vocabulary. • Can investigate passing messages to each other from set distances. • Can fill in STEM sentences with a word bank to aid their Conclusion 	

Year 4 – Spring 1 – Electricity		
NC objectives	Ideas for teaching	Key knowledge and vocabulary
Sc4/4.2a identify common appliances that run on electricity	<ul style="list-style-type: none"> Using a range of objects (12-14) can identify how they work – electricity, battery, wind up, force. Can identify and explain what electricity is. Battery or mains quiz. Bingo – using items such as wind up objects, batteries and main. Can they identify which is which and win! Can understand and explain that the electricity doesn't just come from a plug – lots happen before it gets to the plug. 	<p>Big idea(s): P1, P3, C2</p> <p>Famous Scientist: Thomas Edison</p> <p><u>Revision</u> component, conductor, energy, insulator, particle, property, material</p> <p>An object is made from/of a material Metal is a material from which objects can be made. Matter (stuff) is made from tiny building blocks Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another</p>
Sc4/4.2b construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers	<ul style="list-style-type: none"> Circuit on the WB – Can discuss what it is. Can discuss the components. Can discuss how it works. Can identify what a circuit is. Can match the symbols to the name (Cells, battery, switch, wires, bulbs and buzzers) Can create a circuit based on an image given. (Mixture of working and non-working circuits) Can discuss the workings as a class – writing key vocabulary on the WB. Can create a 5-7 simple circuits investigating using cells, batteries, switches, wires, bulbs and buzzers. Can draw a range of the circuits before building them. (Supplied with mat of symbols to assist) Can draw a range of the circuits after building them. (Supplied with mat of symbols to assist) Can explain why they worked or didn't. 	<p><u>New learning and vocabulary</u> circuit, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, chemical reaction, emit</p>
Sc4/4.2c identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery	<ul style="list-style-type: none"> Can identify problems in circuits from pictures or given (ones with no cells or batteries or something not connected). Can create a circuit based on an image given. (Mixture of working and non-working circuits) Can discuss the workings as a class – writing key vocabulary on the WB. Can make a range of simple circuits (3-4) (2 wires, battery and bulb) before making, draw them and say whether you think it will work or not and give a reason. 	<p>Know that electrical energy is one of many forms of energy Know that static electricity is an imbalance of charged particles on a material; it does <u>not</u> operate by flowing around a complete circuit Know that current electricity is the flow of charged particles called electrons around a circuit Know that electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators Know that conductors have free electrons and that when electrical current flows around a conductor the electrons move Know that electrical conductivity (how well a material conducts electricity) is an example of a property Know that metals are good electrical conductors Know that a chemical reaction inside a cell produces the charged particles that can flow around a circuit</p>

<p>Sc4/4.2d recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p>	<ul style="list-style-type: none"> • Can make a range of simple circuits (3-4) (2 wires, battery and bulb), draw them after making and say whether it worked or not. Make sure to give a reason. • Teacher to make a circuit for smaller groups with a switch. • Can discuss in teams why their light isn't working. • Can brainstorm and work to identify and/or fix their circuit. • Can explore their explanations to the uses of a switch. • Can make a circuit that has a switch from a given image. • Can draw this, using the correct symbols, and explain if it has worked or not and why. This can be repeated with working and non-working images. • Could make a game using a range of materials. 	<p>Know that more than one cell lined up to work together is called a battery Know that electrical current can flow if there is a complete circuit Know that wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit Know that when electrical current flows through a circuit components within that circuit – such as buzzers which make a noise and bulbs which emit light – begin to work Know that a switch functions by completing or breaking a complete circuit Know how to construct a simple circuit using components Know that exposure to high levels of electrical current can be dangerous</p>
<p>Sc4/4.2e recognise some common conductors and insulators, and associate metals with being good conductors.</p>	<ul style="list-style-type: none"> • Can look at a wire and explore the materials it has been made with. • Can identify that one is a conductor and one is an insulator. • Can match a definition to a conductor and insulator. • Can sort 12 materials into insulators and conductors. • Can explore whether all materials conduct electricity. • Can explore a broken circuit – how could it be fixed. • Can explore a range of material (give 6) that will or will not make the circuit complete. 	

Year 4 – Spring 2 – Solids, liquids and gases

NC objectives	Ideas for Teaching	Key knowledge and vocabulary
Sc4/3.1a compare and group materials together, according to whether they are solids, liquids or gases	<ul style="list-style-type: none"> Can group whether an object/material is a solid, liquid or gas using a Venn diagram. Can match the definitions to a solid, liquid or gas. Can match the picture or the particles of a solid, liquid or gas to the definition. Can group a range of items based on their properties (solid, liquid or gas) Can compare the movement of sand (solid) to the movement of water (liquid) Can compare the movement of paper (solid) to the movement of oobleck (non-Newtonian liquid) 	<p><u>Big idea(s)</u>: C1, C2, C2</p> <p><u>Famous Scientist</u> Marie Curie</p> <p><u>Revision</u></p> <p>absorption, dissolving, energy, evaporation, freezing, matter, melting, particle, temperature, ice, water, solid</p> <p>An object is made from/of a material Materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material Know that matter (stuff) is made from tiny building blocks</p>
Sc4/3.1b observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)	<ul style="list-style-type: none"> Can pick a range of items that would change state is heated (pick 4 out of a pile of 10) Can pick a range of items that would change state is cooled (pick 4 out of a pile of 10) Research and create a table to different melting and freezing point of chocolate, water, ice, crayons, plastic, gold, rubber and glass. Can discuss and fill in the blanks of a pre-written conclusion about the differences in melting and freezing points. Can investigate the time taken to melt chocolate, crayons and ice over a heat. Can investigate the time taken to cool chocolate and water in the same freezer. Can explain and/or investigate that the like of chocolate will go from solid – liquid – back to solid. Can children explain this process. The same with water – ice – back to water. Can explain what has happened in the investigations with a given word bank that children have to use a minimum of 4 scientific words. 	<p><u>New learning and vocabulary</u></p> <p>bond, condensation, evaporation, reversible, boiling point, melting point, liquid, gas, thermometer, water cycle, continuous precipitation, transpiration, surface run off process, sublimation</p> <p>Know that things are composed of a material in one of three states of matter: solid, liquid or gas Know that things are made of particles (tiny building blocks) and that these are organized differently in different states Know that materials can change state when temperature changes Know that there are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas</p>

<p>Sc4/3.1c identify the part played by evaporation and condensation in the water cycle</p> <p>and associate the rate of evaporation with temperature.</p>	<ul style="list-style-type: none"> • Can discuss the terms: condensation, evaporation, precipitation and collection. • Can place these on a water cycle picture. • Can match the definition to the term. • Can create, in groups, their own water cycle in a bag. • Can explain with a word bank what the terms condensation and evaporation. • Can explain the link between the evaporation and condensation using a word bank. • Can explore the process of an ice cube, Frozen – melt – evaporate. Can use these in different scenarios. • Can investigate the Ice Cube Investigation – Container with water – cling film on top – ice cube on top of the cling film. What do they see in the container? What can you observe on the cling film? What processes are occurring? • Salt and ice experiment. 	<p>Know that when solids turn into liquids, this is called melting and that the reverse process is called freezing</p> <p>Know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensation</p> <p>Know that when a solid turns into a gas without passing through the liquid state, this is called sublimation</p> <p>Know that the melting point of water is 0° C and that the boiling point of water is 100° C</p> <p>Know that water flows around our world in a continuous process called the water cycle</p> <p>Know that, along with evaporation, water on the Earth's surface moves to the air in a process called transpiration in which water turns into water vapour (gas) on the surface of leaves on plants</p> <p>Know that rain condenses in clouds and falls to earth as rain, snow or hail in a process called precipitation</p> <p>Know that water flows across the land in rivers and streams in a process called surface run-off and under the ground as groundwater</p>
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Year 4 – Summer 1 and 2 – Living things and their habitats		
NC objectives	Ideas for teaching	Key knowledge and vocabulary
Sc4/2.1a recognise that living things can be grouped in a variety of ways	<ul style="list-style-type: none"> Can recap the animal groups (Mammal, Amphibians, Reptiles, Birds, Fish). Can recap the terminology: vertebrate and invertebrates. Can group 18 pictures into the animal groups (Mammal – Bat, fox, dolphin, tiger. Birds – Eagle, owl, ostrich. Fish – Salmon, Goldfish, Angelfish and seahorse. Reptiles – Tortoise, Chameleon, snake and crocodile. Amphibians – Frog, Toad, Newt. Can group 18 pictures into Vertebrate and invertebrates (Vertebrates - Eagle, Owl, Tiger, Dolphin, Seahorse, Frog, Toad, Snake, and Crocodile. Invertebrates – Snail, Lobster, Starfish, Sea Cucumber, Ant, Bee, Butterfly and slug. Circles with animals in each. Can say what group the animals belong to and why. E.G. If it was a mammal – why is it a mammal, what features would it have? Can pick 4 animals (From different groups) can say what group the animal belongs to and why. E.G. Picture of a frog. It is an amphibian. I know this because amphibian means two-lives. They are able, when adults, to live on land and in water. 	<p><u>Big idea(s):</u> B2, B3</p> <p><u>Famous Scientist:</u> Jacques Cousteau</p> <p><u>Revision</u> decay, energy, habitat, freezing plant, structure, herbivore, carnivore, omnivore, microhabitat, environment, reproduction, vertebrate</p> <p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p>Polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice.</p> <p>A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal</p> <p>Herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants</p> <p>A cat is an example of a carnivore; that a rabbit is an example of a herbivore; know that many humans are examples of omnivores (though not vegetarians)</p> <p>Fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone</p> <p>Fish are different in having gills so that they can breathe underwater and have scaly skin</p> <p>Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land</p> <p>Reptiles are different in that they breath air and have scaly skin</p> <p>Birds are different to other animals in that they have feathers and wings</p> <p>Mammals are different to other animals in that they have fur/hair and they feed milk to their young</p> <p>Know a rose bush, grass, dandelion by sight</p> <p>Know an ash tree, birch tree and conifer tree by sight</p>
Sc4/2.1b explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment	<ul style="list-style-type: none"> Can classify a range of different sweets. Discuss why they have classified in that way. Give children the option to classify again based on the discussions. Can create a classification key based around sweets. Can group animals into vertebrates and invertebrates. Can match 16 animals to their environment (Artic, Desert, Ocean, Rainforest, Urban and Woodland) Can research 5 – 7 questions (Does it lay eggs? Does it have scales? Does it have wings? Does it have a beak? Does it have legs? Does it have fur? About rainforest habitats (Jaguar, Tapir, Toucan, Fruit bat, Hummingbird, Tree Frog, Anaconda, Caiman) Can research 5-7 questions (Is it a plant? Has it got legs? Is it a vertebrates? Does it climb trees? Does it have a bushy tail? Does it have feathers? Does it have a yellow flower? About Urban habitats (Fox, Rat, Squirrel, Pigeon, Slug, Woodlouse, Dandelion, Nettle) Can research 5-7 questions (Does it have wings? Is it a vertebrate? Does it have legs? Does it have a trunk? Does it have spines? For Woodland habitats (Bluebell, Badger, Owl, Woodpecker, Hedgehog, Oak Tree, Ant and Earthworm. Can create a classification key using the above information. 	<p><u>New learning and vocabulary</u> kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution</p>

Sc4/2.1a recognise that living things can be grouped in a variety of ways

Sc4/2.1b explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment

- Can recap the animal groups (Mammal, Amphibians, Reptiles, Birds, Fish).
- Can recap the terminology: vertebrate and invertebrates.
- Can group 18 pictures into the animal groups (Mammal – Bat, fox, dolphin, tiger. Birds – Eagle, owl, ostrich. Fish – Salmon, Goldfish, Angelfish and seahorse. Reptiles – Tortoise, Chameleon, snake and crocodile. Amphibians – Frog, Toad, Newt.
- Can group 18 pictures into Vertebrate and invertebrates (Vertebrates - Eagle, Owl, Tiger, Dolphin, Seahorse, Frog, Toad, Snake, and Crocodile. Invertebrates – Snail, Lobster, Starfish, Sea Cucumber, Ant, Bee, Butterfly and slug.
- Circles with animals in each. Can say what group the animals belong to and why. E.G. If it was a mammal – why is it a mammal, what features would it have?
- Can pick 4 animals (From different groups) can say what group the animal belongs to and why. E.G. Picture of a frog. It is an amphibian. I know this because amphibian means two-lives. They are able, when adults, to live on land and in water.
- Can classify a range of different sweets. Discuss why they have classified in that way. Give children the option to classify again based on the discussions.
- Can create a classification key based around sweets.
- Can group animals into vertebrates and invertebrates.
- Can match 16 animals to their environment (Arctic, Desert, Ocean, Rainforest, Urban and Woodland)
- Can research 5 – 7 questions (Does it lay eggs? Does it have scales? Does it have wings? Does it have a beak? Does it have legs? Does it have fur? About rainforest habitats (Jaguar, Tapir, Toucan, Fruit bat, Hummingbird, Tree Frog, Anaconda, Caiman)
- Can research 5-7 questions (Is it a plant? Has it got legs? Is it a vertebrates? Does it climb trees? Does it have a bushy tail? Does it have feathers? Does it have a yellow flower? About Urban habitats (Fox, Rat, Squirrel, Pigeon, Slug, Woodlouse, Dandelion, Nettle)
- Can research 5-7 questions (Does it have wings? Is it a vertebrate? Does it have legs? Does it have a trunk? Does it have spines? For Woodland habitats (Bluebell, Badger, Owl, Woodpecker, Hedgehog, Oak Tree, Ant and Earthworm.
- Can create a classification key using the above information.

Big idea(s): B2, B3

Famous Scientist: Jacques Cousteau

Revision

decay, energy, habitat, freezing plant, structure, herbivore, carnivore, omnivore, microhabitat, environment, reproduction, vertebrate

Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.

Polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice.

A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal

Herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants

A cat is an example of a carnivore; that a rabbit is an example of a herbivore; know that many humans are examples of omnivores (though not vegetarians)

Fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone

Fish are different in having gills so that they can breathe underwater **and** have scaly skin

Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land

Reptiles are different in that they breath air **and** have scaly skin

Birds are different to other animals in that they have feathers and wings

Mammals are different to other animals in that they have fur/hair **and** they feed milk to their young

Know a rose bush, grass, dandelion by sight

Know an ash tree, birch tree and conifer tree by sight

New learning and vocabulary

kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution

<p>Sc4/2.1c recognise that environments can change and that this can sometimes pose dangers to living things.</p>	<ul style="list-style-type: none"> • Can recap different environments (Arctic, Desert, Ocean, Rainforest, Urban and Woodland). • Can recap by matching animals to their environments (Arctic, Desert, Ocean, Rainforest, Urban and Woodland). • Can discuss as a class how environments can change. Could add their answer to a Postit and bring to the front – work as a team. • Can classify these into natural and human made changes. • Can create a fact sheets about the effects of one of the changes in environments (Climate change, deforestation, Pollution, Drought etc.) 	<p>Know that animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and based on their behavior (e.g. herbivores, carnivores and omnivores)</p> <p>Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms</p> <p>Know that a species is a group of living things have many similarities that can reproduce together produce offspring</p> <p>Know that a classification key uses questions to sort and identify different living things</p> <p>Know how to use a classification key to identify living things</p> <p>Know how to create a classification key to sort plants on the school premises</p> <p>Know that changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies</p> <p>Know that human activity – such as climate change caused by pollution - can change the environment for many living things, endangering their existence</p> <p>Know that the polar bear is a famous example of climate change endangering the existence of a species; as the climate changes and gets warmer, the sea ice on which polar bears live reduces in amount making it harder for them to survive and reproduce</p>
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Year 5

Year 5 – Ongoing throughout year – Working scientifically

NC objectives

Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

- Can plan an investigation with the teacher and class (needs to be a mixture of fair test, comparative, pattern seeking, observations and researching using secondary sources).
- Can identify and gather equipment needed for an investigation independently.
- Can identify and explain how to stay safe around a scientific investigation.
- Can plan an investigation in small groups.
- Can offer suggestions to improve investigations using prior knowledge or further questions.
- Can follow a 5+-step procedure independently.
- Can determine strengths and weaknesses in a procedure and improve upon these.
- Can identify the variables in their investigation, with support.
- With support, recognize that secondary sources can be used to answer questions that cannot be answered through practical work.
- With support, can recognize patterns and relationships using a suitable sample.

Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision

- Can use measuring equipment from previous years with accuracy.
- Can, with support, select the most suitable measuring equipment to give the most precise results (ruler, tape measure or trundle wheel, force meter with a suitable scale.)
- Make decisions whether they need to:
- Take repeat reading (Fair test)
- Increase sample size (Pattern seeking)
- Adjust the observation period and frequency (observe over time)
- Check further secondary sources (researching)
- In order to get accurate data (Closer to the true value)

In Year 5, children may need support to be able to recognize what needs to be done next.

- Aide their observations or enquiries by using:
 - a magnifying glass -meter sticks -torches -tape measures
 - scales (digital) -stop watches -beakers -pipettes
 - digital microscopes -thermometers (different increments)
 - data loggers -IT Temperature sensors (Support)
 - Spring balance (Support) -Classification keys

Key knowledge and vocabulary

Revision

prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

Know that we can ask questions and answer them by setting up scientific enquiries
 Know how to make relevant predictions that will be tested in a scientific enquiry
 Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same
 Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches
 Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table
 Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion
 Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry
 Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true
 Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry
 Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)
 Know that they can draw conclusions from the findings of other scientists
 Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry

New learning and vocabulary

line graph, relationship, outlier

Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth)
 Know how to identify conditions that were imperfectly controlled and can explain how these might affect results
 Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device
 Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement
 Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion. Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary
 Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)

Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs

- Record data by:
 - Annotated photographs (4+)
 - Videos (could add voice over)
 - Labelled diagrams (5+)
 - Observational drawings
 - Labelled scientific diagrams/writing.
- Record measurements using:
 - Using tables
 - Tally charts
 - Bar charts
 - Line graphs
 - Scatter graphs

In Y5, this will need to be modelled and examples available for the children. Be aware of what they have done in Maths – you may need to pre teach the drawing of line and scatter graphs.

- Record classification by:
 - Venn diagrams (Independently)
 - Carroll diagrams (Support)
 - Classification keys (Support)

Sc5/1.4 using test results to make predictions to set up further comparative and fair tests

- Can use knowledge of the investigation, data gathered and conclusion to support in creating a new investigation using a prediction.

Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations

- Children can orally conclude on their findings using scientific vocabulary.
- Children can write a detailed conclusion using a scientific word bank for support. Word bank to be created as a class not given.
- To use their conclusion to identify the relationships and patterns, identify results that do not fit the overall pattern and to explain their findings using their subject knowledge.

Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments.

- Use knowledge learnt to discuss ideas and finding from scientists (E.G. - Earth is flat??)
- They talk about how their scientific ideas change due to new evidence that they have gathered – how they have planned further research to develop their conclusions more.
- They talk about how new discoveries change scientific understanding. (SCIENCE ISN'T A FINISHED PRODUCT)
- Can answer their own and others questions based on:
 - Observations made
 - Measurements taken
- Have to give back up their answers with at least one piece of evidence.

Possible questions to ask:

Comparative and fair testing

- Which seed shape takes the longest time to fall?
- Who grows the fastest, girls or boys?
- Which type of sugar dissolves the fastest?
- How does the length of daylight hours change in each season?
- How does age affect a human's reaction time?
- How does the angle of launch affect how far a paper rocket will go?

Observations over time?

- How do brine shrimp change over their lifetime?
- How does a bean change as it germinates?
- How does our compost heap change over time?
- How does a container of salt water change over time?
- How does a sugar cube change as it is put into a glass of water?

Pattern Seeking

- Is there a relationship between a mammal's size and its gestation period?
- Are the oldest children in our school the tallest?
- Do all stretchy materials stretch in the same way?
- Is there a pattern between the size of a planet and the time it takes to travel around the Sun?
- Do all objects fall through water in the same way?

Identifying, classifying and grouping

- Can you identify all the stages in the human life cycle?
- Compare this collection of animals based on similarities and differences in their lifecycle.
- How could you organize all the objects in the solar system into groups?
- Can you label and name all the forces acting on the objects in each of these situations?
- Can you observe and identify all the phases in the cycle of the Moon?

Researching using secondary sources

- What are the differences between the life cycle of an insect and a mammal?
- Why do people get grey/white hair when they get older?
- What are micro plastics and why are they harming the planet?
- How have our ideas about the solar system changed over time?
- What unusual objects did Jocelyn Burnell discover?
- How do submarines sink if they are full or air?

Year 5 – Autumn 1 - Earth and space

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc5/4.1a describe the movement of the Earth, and other planets, relative to the Sun in the solar system</p>	<ul style="list-style-type: none"> • Can recap the four seasons (Autumn, Winter, Spring and Summer.) • Can name the planets in the solar system (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune) • Can order the planets. • Can match similar sized objects to the planets (Fruit Solar System, Playdoh Planets or Solar System in my Pocket) • Can research 4 facts about each planet. • Can research the lengths of a year in 4 different planets. • Can identify the two models associated with Earth and Space: Heliocentric - Planets orbit around the Sun Geocentric – The planets and the sun orbited around the Earth. <p>Scientist to look at for this is Nicolaus Copernicus.</p> <ul style="list-style-type: none"> • Can identify and explain (using a word bank) that the sun is the center of the Solar system and that the Earth orbits it as well as the other planets. 	<p><u>Big idea(s):</u> E1, E2 <u>Famous scientist –</u> Stephen Hawking <u>Revision</u> absorption, energy, freezing, melting, orbit, reflection, wave, Sun, spring, summer, autumn, winter</p> <p>Days are longer in the summer and shorter in winter Weather changes through the year, getting hotter in the summer and colder in the winter Earth orbits the Sun with one orbit constituting a year of 365/366 days Light is a form of energy We need light to see things and that darkness is the absence of light Light travels in straight lines Everything that we can see is either a light source or something that is reflecting light from a light source into our eyes The Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun Many light sources give off light and heat The Sun gives off light and heat when hydrogen turns into helium</p> <p>(NB: the Sun and the Earth are capitalized when being discussed in an astronomical context.)</p>
<p>Sc5/4.1b describe the movement of the Moon relative to the Earth</p>	<ul style="list-style-type: none"> • Can identify that the moon spins on its own axis. • Can identify that that moon orbits the Earth at the same time of it spinning on its axis. • Can research (using info from Ogden Trust) the significant events surrounding the Moon. • Can use ping pong balls (half white and half black) to demonstrate the movement between the Moon, Earth and Sun. • Can describe using a word bank or scientific vocab the movement between the Moon and Earth. 	<p><u>New learning and vocabulary</u> planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, Moon, rotating, lunar, solar, telescope, rotation</p> <p>Know that the universe comprises all matter and space in existence Know that a celestial body is a large object in the universe Know that a star is an exceptionally hot ball of gas, originally made from hydrogen and helium Know that the Sun is a star Know that a planet (e.g Earth) is defined as a spherical celestial body that orbits a star and that has cleared the neighbourhood of its orbit of other objects, some of which crash into the planet and others that become moons of that planet Know it was once thought that everything orbited the Earth, but that scientists like Copernicus and Galileo used telescopes and measurement to show that the Earth orbited the Sun Know that there are eight major planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune Know that the universe is utterly vast and that our solar system makes up a tiny fraction of the universe</p>
<p>Sc5/4.1c describe the Sun, Earth and Moon as approximately spherical bodies</p>	<ul style="list-style-type: none"> • Go outside discuss the shape of the Earth. • Can give reasons with a word bank of their understand or discussions. • Using prior knowledge (Nicolaus Copernicus) discuss the fact the Earth is not flat and scientific evidence for it. • Identify that the Sun, Earth and Moon as spherical due to gravity. • Can research and find 3 facts that tell us the Earth, Moon and Sun is spherical. 	

<p>Sc5/4.1d use the idea of the Earth's rotation to explain day and night, and the apparent movement of the Sun across the sky.</p>	<ul style="list-style-type: none"> • Can watch (Sun Movement) and discuss how the position of the sun changes over the day, why, where, when this happens) Remember – This does not mean that the sun is moving. • Can explain that the apparent movement of the sun is a result of the Earth rotating or spinning. • Can use a compass to record the direction of the sun over a number of days. Make sure they do this at the same time of day. Can also compare this with different times of day. • Can design and make a sundial to record the position of the sun throughout the day. • Can identify, through class discussion, that we have different moon phases. • Can sequence the moon phases. • Can name the moon phases (New Moon, Waxing Crescent moon, First quarter moon, Waxing Gibbous moon, full moon, Waning gibbous moon, Last quarter moon, Waning crescent moon. • Can identify 1 fact about each moon phase. • Can place the moon phases on a diagram of a lunar month. • 	<p>Know that a satellite orbits a planet and that moons are natural satellites Know that the Moon orbits the Earth roughly every 28 days Know that as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses Know that humans have sent man-made satellites into orbit that assist with telecommunication Know that all the planets in the solar system orbit the Sun and that the further away they are from the Sun, the longer their orbit Know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit Know that night and day are the result of the Earth rotating on its axis Know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area Know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon</p>
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Year 5 – Autumn 2 - Forces

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc5/4.2a explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p>	<ul style="list-style-type: none"> Can compare falling objects (feather and a rock, different size balls and different small toys) Can support these falling objects with some T support. Can discuss the difference between unsupported objects and supported objects. (with word bank and some STEM sentences) Can discuss the direction of rain around the Earth – Pictures in the knowledge. Can explain using a word bank why diagram looks that way. Can discuss two pictures (one with an astronaut on the Moon and one with an astronaut on the Earth) Can use a word bank and definition to sort them into the two categories (See knowledge) Can research the effects of gravity on different plants (Moon and Earth). Can find 6 facts, similarities and differences based on Gravity and forces. 	<p><u>Big idea(s):</u> P1, P2</p> <p><u>Famous Scientist:</u> George Cayley</p> <p><u>Revision</u> energy, matter, particle, surface, friction, force, stretch, squash, rotation, rough, smooth, sliding friction, static friction</p> <p>A force can be thought of as a push or a pull As objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller. Applying forces to objects can change their shape. Know that the roughness of a material is an example of a property There are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed). Objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves</p> <p><u>New learning and vocabulary</u> acceleration, air resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance, weight</p> <p>Know that a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move Know that pull forces can be measured using a device called a force meter Know that the amount of matter (stuff) in an object is its mass Know that gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together Know that unsupported objects are pulled towards the Earth by the force of gravity Know that acceleration is a change in speed and that unbalanced forces acting on an object cause it to accelerate Know that air resistance is a force felt by an object as it moves through the air; it is caused by the object bumping into the gas particles that make up air; the quicker an object moves, the more gas particles it bumps into and the more air resistance it experiences</p>
<p>Sc5/4.2b identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p>	<ul style="list-style-type: none"> Can explore the falling of 3 different shaped paper but the same size (scrunched into a ball, folded and untouched). Can attempt to fly a range of kites as a class. Can sort 10 pictures of things that have air resistance acting upon them and not. Can match the definition of air resistance to its name. Can explain how it feels to walk around deep water (word bank) Can explore the resistance of plasticine in water – Same piece of plasticine but different shapes. Or foil in water. Can sketch the shape of plasticine or the foil. Can explain the effects of the shape of plasticine or the foil (word bank) Can match the definition of water resistance to its name. Can spot 2 similarities and differences between two pictures that show things that are streamlined and not. Can discuss and explain the term streamlined. Can set up an experiment to investigate streamlining. (We want to find out which shapes are most streamlined (least resistance) and which shapes are least streamlined (most resistance) Can recap prior knowledge about friction. Can define the term friction, materials and properties. Can set up an investigation to investigate how a car moves or a shoe moves along different surfaces (with support). 	

<p>Sc5/4.2c recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect</p>	<ul style="list-style-type: none"> • Recap terminology – gravity, friction, air resistance, water resistance. • Look around your surroundings and identify the objects that have pulley, lever and gears. • Pictures of items (ice-cream scoop, wind up whisk, tin opener, scissors, pulley of buckets, cork screw, pictures of these in a car engine, piano pedals). Can they identify the pulley, lever or gear? • Can, using a picture and definitions, identify the load, motion, effort and fulcrum. • Can set up an investigation, with lolly sticks (make a catapult). Explore different sized lolly sticks. 	<p>Know that a falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down</p> <p>Know that a parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity</p> <p>Know that water resistance is a force felt by an object as it moves through water; it is caused by the object bumping into the water particles</p> <p>Know that the shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined</p> <p>Know how to draw a force diagram with arrows representing the different forces acting on an object</p> <p>Know that a lever is a rigid length pivoting around a fulcrum</p> <p>Know that a pulley is a wheel with a fulcrum that supports a moving cable or belt</p> <p>Know that a gear is a rotating wheel with cut teeth that mesh with the teeth of another gear so that turning one gear turns an adjacent gear in the opposite direction</p> <p>Know that gears, levers and pulleys are simple machines that used to allow a smaller force to have a greater effect; they do this by moving a smaller force over a longer distance at one end of the machine, which the machine turns into a larger force over a small distance at the other end</p>
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Year 5 – Spring 1 & 2 and Summer 1 - Properties and changes of materials

NC objectives	Ideas for teaching	Key knowledge and vocabulary
Sc5/3.1a compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets	<ul style="list-style-type: none"> Can recap what the properties of materials are. Can match the definitions to the properties (hardness, solubility, transparency, conductivity, magnetism) Can group 20 materials in 4 groups (waterproof, not-waterproof, flexibility and not flexible) Can explain 3-4 similarities between glass, chalk and paper clips. Can explain 3-4 differences between glass, chalk and paper clips. Can compare two objects (e.g. two 2p coins one magnetic and one not – compare them. To find between 6 in your and 10 similarities and differences. Can compare two objects (e.g. two water bottles. One sports bottle and one pop bottle - compare them. To find between 6 and 10 similarities and differences. 	<p><u>Big idea(s):</u> C2, C3</p> <p><u>Famous Scientist:</u> Becky Schroeder or Sarah Gilbert</p> <p><u>Revision</u></p> <p>absorption, bond, condensation, conductor, evaporation, matter, melting, particle, property, reversible, freezing, wood, plastic, glass, metal, water, rock, suitability, surface, waterproof, flexible, rigid, boiling point, melting point, solid, liquid, gas, sublimation, magnetic</p>
Sc5/3.1b know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution	<ul style="list-style-type: none"> Could have sand in water and ask the children how can we separate the mixtures. Can then, after class discussion, define the terms soluble, insoluble and saturated Practical activities: Cold water with salt, sugar and coffee. Warm water with salt, sugar and coffee. Can dissolve a solid into a liquid. Can describe and perform an investigation to recover the solid. Can explain why you can or can't recover the solid. Can explain and observe the mixing to create a new solution. 	<p>One can distinguish between materials made of wood, plastic, glass, metal, water, rock</p> <p>An object is made from/of a material</p> <p>Materials can have useful properties for a given job (including being waterproof, strong, weak, hard, soft, flexible, rigid, solid, runny, light, heavy, smooth, rough, flexible or rigid.)</p> <p>Electrical conductivity (how well a material conducts electricity) is an example of a property</p> <p>Metals are good electrical conductors</p> <p>Many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy, Things are composed of a material in one of three states of matter: solid, liquid or gas</p> <p>Things are made of particles (tiny building blocks) and that these are organized differently in each state</p> <p>Materials can change state when temperature changes</p> <p>There are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas</p>
Sc5/3.1c use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating Sc5/3.1e demonstrate that dissolving, mixing and changes of state are reversible changes	<ul style="list-style-type: none"> Recap solid, liquid and gasses grouping 20 pictures into their groups. Can define what a solid, liquid and gas is. Practical activities: Sand and water for filtering Copper nails and iron nails for magnetism Raisins and flour for sieving Water and salt for evaporating by heating. Can complete above investigations in groups. Can explain which process they would use based on the properties of the solids or liquids. Can explain using word banks that some changes are reversible and irreversible. 	<p>When solids turn into liquids, this is called melting and that the reverse process is called freezing</p> <p>When liquids turn into gases, this is called evaporation and that the reverse process is called condensation</p> <p>When a solid turns into a gas without passing through the liquid state, this is called sublimation</p> <p>The melting point of water is 0° C and that the boiling point of water is 100° C</p> <p>Some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic</p>
Sc5/3.1d give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic	<ul style="list-style-type: none"> Matching a use to a material – is it appropriate Explain why it is or why it isn't appropriate. Investigation into the best material for a switch in a circuit. Investigation into the best material for a cup – is metal the best? Investigation into the best material for a new pan set. Explain why things are used for particular job or uses. 	<p><u>New learning and vocabulary</u></p> <p>irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallization, thermal, chemistry</p> <p>Know that materials can be sorted in a variety of ways based on their properties</p> <p>Know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, the solid is called a solute, the liquid is called a solvent and the result is a solution; when a solid does dissolve in a liquid it is described as being soluble in that solvent (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water)</p>

<p>Sc5/3.1f explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.</p>	<ul style="list-style-type: none"> • Can recap the term reversible and irreversible. • Can sort 20 photos into groups of reversible and irreversible. • Can explore a range of investigations (round robin) can discuss and explain their findings. • Can create and set up their own investigation to explore irreversible change (given a choice of investigations, methodology and word bank supplied) 	<p>Know that a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturated</p> <p>Know that when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals – the slower the solvent evaporates, the larger the crystals that will be formed</p> <p>Know how to dissolve and a solute in a solvent and then how to evaporate the solvent to recover the solute</p> <p>Know that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place</p> <p>Know that an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas (e.g. burning, boiling an egg, the reaction of bicarbonate of soda and acid)</p> <p>Know that filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated</p> <p>Know how to separate a mixture of sand, salt and small stones by sieving (to remove the small stones), followed by dissolving in water (so the salt is absorbed), followed by filtering to remove the sand from the mixture, followed finally by evaporation of the water to recover the salt.</p> <p>Know that materials' different properties can be tested through acting upon them, including testing to find whether materials are magnetic, thermally conductive and electrically conductive; know that the various properties of different materials make them suitable for a given function</p> <p>Know how to explain orally and in writing the reasons why various materials are suited or unsuited to a function</p>
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Year 5 – Summer 2 - Living things and Life Cycles
Animals, Inc Humans

NC objectives	Ideas for Teaching	Key knowledge and vocabulary
Sc5/2.1a describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird	<ul style="list-style-type: none"> Can recap what a mammal, amphibian, insect and bird is. Can identify features of the above to the animal (word bank and pictures provided) One animal of each category – what makes that animal a mammal etc. Can describe 1 difference between a flowering plant and a non-flowering plant (Life cycle poster given) (Word bank given) Can describe 1 similarity between a flowering plant and a non-flowering plant. (Life cycle poster given) (Word bank given) Can describe 1 difference between a complete Metamorphosis Insect and an Incomplete Metamorphosis Insect. (Life cycle poster given) (Word bank given) Can describe 1 similarity between a complete Metamorphosis Insect and an Incomplete Metamorphosis Insect. (Life cycle poster given) (Word bank given) Can describe 1 difference between two different mammals (Life cycle poster given) (Word bank given) Can describe 1 similarity between two different mammals (Life cycle poster given) (Word bank given) 	<p><u>Big idea(s):</u> B1</p> <p><u>Famous scientist:</u> David Attenborough</p> <p><u>Revision</u> decay, plant, structure, reproduction, nutrients, reproduction, fish, bird, amphibian, reptile, mammal, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization, insect, vertebrates</p> <p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p>A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal</p> <p>Fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone</p> <p>Fish are different in having gills so that they can breathe underwater and have scaly skin</p> <p>Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land</p> <p>Reptiles are different in that they breath air and have scaly skin</p> <p>Birds are different to other animals in that they have feathers and wings</p> <p>Mammals are different to other animals in that they have fur/hair and they feed milk to their young</p> <p>Different parts of plants have one or more functions (jobs)</p> <p>Roots collect water and minerals from the soil, and hold the plant firmly in the ground</p> <p>The stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; the stem also transports water and minerals from the roots to the other parts of the plant</p> <p>The leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates</p> <p>The function of a flower is reproduction, where flowers of the same kind exchange pollen – made by an anther – in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal</p>
Sc5/2.1b describe the life process of reproduction in some plants and animals.	<ul style="list-style-type: none"> Can, through conversation, identify that animals reproduce. Can order and explain the life process of 3 animals (A mammal, fish and amphibian) Will need to use the internet to research their animal. Can, through conversations and word bank, discuss the term sexual and asexual reproduction in plants. Can order the life cycle of sexual reproduction for a plant (pictures and definitions given) Can, through conversations and word bank, discuss the term asexual and asexual reproduction in plants. Can identify 2-3 similarities and differences. 	

<p>Sc5/2.2a describe the changes as humans develop to old age.</p>	<ul style="list-style-type: none"> • Can order pictures of the different stages of life (infancy, childhood, adolescence, early adulthood, and elderly). • Can order the pictures of prenatal (the three trimesters) • Can match the definitions of each stage of pregnancy to the pictures. • Can identify the changes a body will go through in adolescence and puberty. Boys – Larynx, sweat, hair, height, emotions. Girls – emotions/hormones, sweat glands, hair, growing, menstruation. • Can identify what changes occur to human beings as they get older (physical and other changes) • Be given a list of 4 true and false statements (e.g. All older people start to become senile (suffer memory loss) Children to work in groups to discuss these statements. To offer reasons why. • Can identify what causes the main physical changes during old age. • Can name two changes that occur for all humans. • Can name two things you can do during your lifetime to ensure you are healthy when you are in old age. • 	<p><u>New learning and vocabulary</u> life cycle, life span, embryo, womb, weaned, adolescence, metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect</p> <p>Know that the life cycle of a living thing is a series of stages of development starting with a fertilized egg in animals or a seed in many plants Know that in most mammals (e.g. dogs) a fertilized egg develops in the womb into an embryo and is then born and fed on milk before it is weaned onto the food that is adapted to eat; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again Know that in amphibians (e.g. frogs) a fertilized egg develops into an embryo and then hatches into a tadpole; the tadpole develops adult characteristics, metamorphoses into the adult form after which it can reproduce and the cycle can begin again Know that in many insects (e.g. butterflies) a fertilized egg develops into wingless feeding form called a larva (caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this cocoon, the pupa metamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again Know that in birds (e.g. robins) a fertilized egg hatches in a nest (a hatchling) and is fed by its parents until it is ready to fly (i.e. becomes a fledgling); it then leaves the nest and grows into an adult after which it can reproduce and the cycle can begin again Know that humans go through stages of development; they begin as fertilized eggs and then develop into embryos before developing into babies; once they are born, these newborn babies become infants (roughly 2 months to 2 years) then into young children (roughly 2-12 years old); children develop into adults during adolescence (roughly 12-16 years old) at which age they become physically capable of reproduction; as adults develop into old age (roughly 55+ years old) they experience changes in their body which require them to move more carefully and rest more frequently</p> <p>(NB: the changes of adolescence in humans is taught as part of mandatory sex and relationship education; it must be taught with due sensitivity to children's family backgrounds; if in doubt, delay sensitive discussions until the formal teaching of sex and relationship education.)</p>
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Year 6 – Ongoing throughout year – Working scientifically

NC objectives

Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

- Can plan an investigation independently (needs to be a mixture of fair test, comparative, pattern seeking, observations and researching using secondary sources).
- Can identify and gather equipment needed for an investigation independently.
- Can identify and explain how to stay safe around a scientific investigation with evidence to back up their answer.
- Can offer suggestions to improve investigations using evidence from prior research or enquires.
- Can follow a 6+-step procedure independently.
- Can determine strengths and weaknesses in a procedure and improve upon these.
- Can identify the variables in their investigation independently and change them based on their understanding.
- Recognise that secondary sources can be used to answer questions that cannot be answered through practical work.
Can recognize patterns and relationships using a suitable sample

Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision

- Can use measuring equipment from previous years with accuracy and precision.
- Can select the most suitable measuring equipment to give the most precise results (ruler, tape measure or trundle wheel, force meter with a suitable scale.)
- Make decisions whether they need to:
- Take repeat reading (Fair test)
- Increase sample size (Pattern seeking)
- Adjust the observation period and frequency (observe over time)
- Check further secondary sources (researching)
- In order to get accurate data (Closer to the true value)
- Aide their observations or enquiries by using:
 - a magnifying glass - meter sticks - torches
 - tape measures - scales (digital)
 - stop watches - beakers - pipettes
 - digital microscopes - thermometers (different increments)
 - data loggers - IT Temperature sensors (Support)
 - Spring balance (Support) - Classification keys

Key knowledge and vocabulary

Revision

prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

Know that we can ask questions and answer them by setting up scientific enquiries

Know how to make relevant predictions that will be tested in a scientific enquiry

Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same

Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches

Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key
how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table

Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion

Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry

Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true

Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry

Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)

Know that they can draw conclusions from the findings of other scientists

Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry

New learning and vocabulary

line graph, relationship, outlier

Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth)

Know how to identify conditions that were imperfectly controlled and can explain how these might affect results

Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device

Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement

Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion

Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary

Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)

Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs

- Record data by:
 - Annotated photographs (5+)
 - Videos (with scientific explanation)
 - Labelled diagrams (6+)
 - Observational drawings
 - Labelled scientific diagrams/writing.
- Record measurements using:
 - Using tables
 - Tally charts
 - Bar charts
 - Line graphs
 - Scatter graphs

Year 6 children should have experience of the above graphs.

- Record classification by:
 - Venn diagrams (Independently)
 - Carroll diagrams (Independently)
 - Classification keys (Independently)

Sc5/1.4 using test results to make predictions to set up further comparative and fair tests

- Can make a prediction when using prior research or enquiry knowledge.
- Can create a new enquiry using previous research and enquiry knowledge.

Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations

- Children can orally conclude on their findings using scientific vocabulary.
- Children can write a detailed conclusion using scientific vocabulary.
- To use their conclusion to identify the relationships and patterns, identify results that do not fit the overall pattern and to explain their findings using their subject knowledge.
- Can discuss whether their findings are a true reflection. Could they have gathered data for longer or tried other variables?

Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments.

- Use knowledge learnt to discuss ideas and finding from scientists (E.G. - Earth is flat??)
- They talk about how their scientific ideas change due to new evidence that they have gathered – how they have planned further research to develop their conclusions more.
- They talk about how new discoveries change scientific understanding. (SCIENCE ISN'T A FINISHED PRODUCT)
- Can answer their own and others questions based on:
 - Observations made
 - Measurements taken
- Have to give back up their answers with 1-2 piece of evidence.

Possible questions to ask:

Comparative and fair testing

- Which is the most common invertebrate on our school playing field?
- Which type of exercise has the greatest effect on our heart rate?
- Which material is the most reflective?
- Which make of battery last the longest?
- How does the angle of light ray hits a plane mirror affect the angle at which it reflects off the surface?

Observations over time?

- What happens to a piece of bread if you leave it on the windowsill for two weeks?
- How does my heart rate change over the day?
- How do different animal embryos change?
- Does the temperature of a light bulb go up the longer it is on?
- How does my shadow change over the day?

Pattern Seeking

- Do larger flowers have more petals?
- Is there a pattern between what we eat for breakfast and how fast we can run?
- Is there a pattern between the size and shape of a bird's beak and the food it will eat?
- Is there a pattern to how bright it is in school over the day?

Identifying, classifying and grouping

- How would you make a classification key for vertebrates/invertebrates or microorganisms?
- Which organs of the body make up the circulation system, and where are they found?
- Compare the skeletons of apes, humans, and Neanderthals – how are they similar, different?
- How would you group electrical components and appliances based on what electricity makes them do?

Researching using secondary sources

- What do different types of microorganisms do? Are they always harmful?
- How have our ideas about disease and medicine changed over time?
- What happened when Charles Darwin visited the Galapagos Islands?
- Why do some people need to wear glasses to see clearly?
- How do astronauts know what stars are made of?

Year 6 – Autumn 1 - Light

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc6/4.1a recognise that light appears to travel in straight lines</p>	<ul style="list-style-type: none"> Can identify from 14 pictures what a light source is. Can give reasons to their answers. Can group 10 pictures into natural and man-made light. Can give reasons to their answers. Can define the term light source. Can discuss the definition of light and dark. Can label a picture of an eye (word bank) (Cornea, Lens, Pupil, Iris, Ciliary Muscle, Retina and Optic Nerve) Can identify what each part of the eye does to help to see. Can investigate with torches and targets around the class. Can the children identify that light cannot travel around things or through things. Can identify and match how light helps us to see (can do this through a diagram and labels) 	<p><u>Big idea(s):</u> P1, P3</p> <p><u>Famous scientist:</u> Alhazen</p> <p><u>Revision</u> absorption, energy, property, reflection, wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source,</p> <p>Light is a form of energy Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another We need light to see things and that darkness is the absence of light Light travels in straight lines Light is reflected when it travels from a light source and then 'bounces' off an object Everything that we can see is either a light source or something that is reflecting light from a light source into our eyes The Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun Many light sources give off light and heat The Sun gives off light and heat when hydrogen turns into helium Filaments in traditional bulbs heat up until they glow, giving off light and heat Fluorescent bulbs glow when electricity adds energy to a gas within the bulb Sunglasses can protect eyes from sunlight but looking at the Sun directly – even with sunglasses – can damage the eyes Opaque objects block light creating shadows and that light passes through transparent objects Opacity/transparency and reflectiveness are properties of a material As objects move towards a light source, the size of the shadow increases The changing of shadow size can be shown by drawing a diagram with straight lines representing light</p> <p>(NB: the Sun and the Moon are capitalized when being discussed in an astronomical context.)</p>
<p>Sc6/4.1b use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye</p>	<ul style="list-style-type: none"> Can explore pictures of reflection, ask questions and discuss answers. Can explore explanations of reflection and can identify if these are true and false. Can identify what reflection is. Can use a diagram to concrete understanding. Can match pictures of reflection to its definition. Can explain why we have reflection. Can investigate if reflection is the same with different surfaces. Can explain why they are or aren't. Can discuss a range of images that show refraction. Can identify and sort true or false statements about refraction. Can match pictures of refraction to its definition. Can explore refraction through various investigations. Can discuss, as a class, what colour is light? Can name the colours of the rainbow. Can investigate with prisms, light, white card and black. Can draw and label what they observed during the investigation. Can explain what happened during the investigation including a how a prism affects a ray of light. (word bank) Can research and explore the work and finding of Issac Newton. Can use prior knowledge of colours and prisms to make a colour wheel. Can draw and label their observations Can explain their findings (word bank) 	

<p>Sc6/4.1c explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes</p>	<ul style="list-style-type: none"> • Can discuss how we see objects. • Can explain how we see objects using a word bank. • Can use a diagram to help us explain this. • Can identify how light helps us to see (could do this through a human model with string – everyone could a certain role) • Can research a periscope. • Can design a periscope. • Can evaluate and conclude on their findings. 	<p><u>New learning and vocabulary</u> angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope</p> <p>incidence and reflection to allow an image to be shown to a viewer</p> <p>Know that translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object; this means that an something seen through a translucent object is not clearly defined</p> <p>Know that when light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction; this happens because light travels at different speeds in different media.</p> <p>Know that white light comprises all the colours of light</p> <p>Know that white light refracted by two surfaces in a prism will spread out so that all of its constituent colours can be seen; this array of colours is called a spectrum; it happens because the different colours of that constitute white light travel at different speeds.</p> <p>Know how to draw a diagram to show why the shape of a shadow will match the shape of an object</p> <p>Know that when light reflects off an object, the angle of incidence is equal to the angle of reflection</p> <p>Know that a periscope takes advantage of the predictable angles of</p>
<p>Sc6/4.1d use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</p>	<ul style="list-style-type: none"> • Can recap prior objective. • Can identify an opaque, transparent and translucent object from a given 25. • Can identify what 10 objects you need to make a shadow. • Can make a shadow show within smaller groups – can use this to create a couple of minute show. • Can explain why the shadow is the same shape as the object. • Can link their explanation to the shape of shadows to prior knowledge of light can't travel through an opaque object or around objects. • Can conclude their findings. • 	

Year 6 – Autumn 2 - Electricity

NC objectives	Ideas for teaching	Key knowledge and vocabulary
Sc6/4.2a associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit	<ul style="list-style-type: none"> Can recap prior knowledge (bulb, switch, cell, battery, wire, conductor, insulator) Can identify the symbols of a simple circuit (Cells, battery, switch, wires, bulbs and buzzers) Matching activity. Can group images of circuits into groups of working or not working. Can give reasons, using scientific terminology, on the reason it works or doesn't. Can build a simple circuit from a given image. Can build a simple circuit (wire, bulb and battery or wire buzzer and battery) without support Can suggest how they would make the bulb brighter or dimmer Can suggest how they would make the buzzer louder or quieter. Can explain, using a word bank, that the battery or the overload of components affect them. 	<p><u>Big idea(s)</u>: P1, P3</p> <p><u>Famous Scientist</u> Joseph Swan</p> <p><u>Revision</u> circuit, component, conductor, energy, insulator, particle, property, material, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, voltage, chemical reaction, emit</p> <p>An object is made from/of a material Metal is a material from which objects can be made. Matter (stuff) is made from tiny building blocks Electrical energy is a form of energy Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another Static electricity is an imbalance of charged particles on a material; it does <u>not</u> operate by flowing around a complete circuit Current electricity is the flow of charged particles called electrons around a circuit Electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators Conductors have free electrons, and when electrical current flows through a conductor, the electrons move like people in a queue Electrical conductivity (how well a material conducts electricity) is an example of a property Metals are good electrical conductors A chemical reaction inside a cell produces the charged particles that can flow around a circuit More than one cell lined up to work together is called a battery Electrical current can flow if there is a complete circuit Wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit When electrical current flows through a circuit components within that circuit – such as buzzers which make a noise and bulbs which emit light – begin to work A switch functions by completing or breaking a complete circuit. A simple circuit can be constructed using components Exposure to high levels of electrical current can be dangerous</p>
Sc6/4.2b compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches	<ul style="list-style-type: none"> Image of a circuit with one bulb, one battery and two wires and an image of 2 bulbs, one battery and three wires – Can list the similarities and differences. Can suggest what they think will happen to the bulbs and/or buzzers. Can make the circuits to test out their prediction. Can do the same as above with another variation inc buzzer or switch. Can design a game using a range of components. Can make a game using a range of components. Can evaluate a game using a range of components. 	

<p>Sc6/4.2c use recognised symbols when representing a simple circuit in a diagram.</p>	<ul style="list-style-type: none"> • To be done throughout the lessons – using a mat of symbols to help at the start of the topic. • Can draw and make a circuits without a mat to help them. 	<p><u>New learning and vocabulary</u> series circuit, parallel circuit, resistance, voltage</p> <p>Know that voltage is a measure of the power of a cell to produce electricity; it is a measure of the 'push' of electric current, not the size of the electric current Know that as the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may 'blow' the bulb or buzzer) Know how to draw simple circuit diagrams Know the recognized symbols for a battery, bulb, motor, buzzer and wire Know how to predict whether components will function in a given circuit, depending on whether or not the circuit is complete; whether or not a switch is in an on or off position; and whether or not there is a cell to provide electrical current to the circuit Know that two bulbs in a circuit can be wired up to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other will not shine as the circuit has been broken; in contrast, if one bulb blows in a parallel circuit, there will still be a complete circuit for the other bulb so it will continue to shine; use this knowledge to explain the advantages of using parallel circuits (e.g. in the lighting in homes)</p>
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Year 6 – Spring 1 – Living things and their habitats

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc6/2.1a describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals</p>	<ul style="list-style-type: none"> • Can recap classification. What is it and how is it used to help? • Can classify/sort/group 20 pictures of animals into mammals, birds, amphibians, fish and reptiles • Can discuss their reasoning behind their groupings. • Can classify/sort/group 20 pictures of fruit and vegetables. • Can discuss their reasoning behind their groupings. • Can research Linnaeus and his classification system. • Can identify and describe the different levels of the classification key (Animalia, Plantae, Protista/Protocista, Fungi and Monera) • Can, as a class, create a list of features you could compare animals with. • Can create a classification key using yes and no answers – will need to use the internet or be given information about these animals. • Can identify two similarity between three animals on their classification key. • Can identify two difference between three animals on their classification key. • Can, as a class, create a list of features you could compare plants with. • Can create a classification key using yes and no answers – will need to use the internet or be given information about these plants. • Can identify two similarity between three plants on their classification key. • Can identify two difference between three plants on their classification key. • Look at the classification of the dog in the knowledge – Share with the children. • Pick another two living things (Jackal, clownfish, cat, ladybird, daisy, rabbit, fox, human. And create a new classification. • Can identify and discuss what a microorganism is. • Can name the 3 types of microorganisms (Virus, bacteria and Fungi) • Can discuss whether something is helpful or harmful (E.G. Cheese – Bacteria are used to ferment milk to make cheese. Yeast ferments the carbohydrate found in grapes to make wine. Antibiotics are created from fungi etc. • Can set up an investigation looking at the best or worst conditions for bacteria to grow – bread in different conditions. 	<p><u>Big idea(s):</u> B2</p> <p><u>Famous scientist:</u> Carl Linnaeus</p> <p><u>Revision</u> component, habitat, plant, structure, fish, bird, amphibian, reptile, mammal, kingdom, classification key, species, fungi, bacteria, characteristics, offspring, vertebrate, invertebrate, insect</p> <p>Animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and based on their behavior (e.g. herbivores, carnivores and omnivores) Living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms A species is a group of living things have many similarities that can reproduce together produce offspring A classification key uses questions to sort and identify different living things A classification key can be used to identify living things Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things. A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal Fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone Fish are different in having gills so that they can breathe underwater and have scaly skin Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land Reptiles are different in that they breath air and have scaly skin Birds are different to other animals in that they have feathers and wings Mammals are different to other animals in that they have fur/hair and they feed milk to their young Different parts of plants have one or more functions (jobs)</p>

<p>Sc6/2.1b give reasons for classifying plants and animals based on specific characteristics.</p>	<ul style="list-style-type: none"> Throughout classifying can give 4 reasons on why they have classified in that way. This objective will link in will all classification lessons as questions and discussions. 	<p><u>New learning vocabulary</u> micro-organism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs</p> <p>Know that there are three types of micro-organism: viruses, fungi and bacteria; of these three, viruses are often not really considered to be alive by many scientists mainly because they don't have the 'machinery' to reproduce inside them</p> <p>Know that germs are disease-causing bacteria</p> <p>Know that an arthropod is an invertebrate with a hard , external skeleton and jointed limbs</p> <p>Know that insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings</p> <p>Know that an arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wings</p> <p>Know that a crustacean is a type of arthropod with two pairs of antennae (e.g. woodlouse)</p> <p>Know that a myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede)</p>
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Year 6 – Spring 2 – Evolution and adaptation

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc6/2.3a recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</p> <p>Sc6/2.3b recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</p>	<ul style="list-style-type: none"> • Can discuss a range of 8 pictures (pictures of dead (fossilised and living animals) • Can sort through a range of 5 definitions and pick the right one for fossils. • Can sequence the fossilisation process. • Can research and explain how fossils are formed (some definitions given) • Can research the different forms of fossilisation (Mold, Cast, Trace and True form) • Can make plaster casts of fossils. <ul style="list-style-type: none"> • Can match a range of pictures (humans and animals, some mixed breeds and some mixed race) To match a puppy to its mam. To match a baby, child to an adult. • To compare and explain 5 similarities and differences between the pictures inc physical features. • Can identify and explain that we pass some features on to our offspring. Can explain why we aren't identical to our parents. • Can bring in photos Grandparents, Parents and Siblings. Teacher can mix these up and chn need to match them back. • To compare and explain 5 similarities and differences between the pictures inc physical features. • Can, with STEM sentence, explain that not all offspring are like their parents. • Can explore these questions - If a woman dyed her hair purple, would the baby have purple hair? If Usain Bolt had a baby would it be a fast runner? 	<p><u>Big idea(s):</u> B3</p> <p><u>Famous Scientist</u> Charles Darwin or Emma Dunne</p> <p><u>Revision</u> birth, decay, energy, habitat, irreversible, extinction, microhabitat, dead, life cycle, food chain, source, nutrients, reproduction, consumption, environment, extinction, species, characteristic, adaptation</p> <p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p>Polar bears are an example of an animal adapted to its environment – thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice.</p> <p>Sharks are another example – smooth skin and streamlined shape for quick swimming; and gills for breathing underwater</p> <p>Cacti are an example of a plant adapted to its environment – thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water</p> <p>Pine trees have thick bark and pine cones to protect against cold winters</p> <p>Woodlice live under logs – an example of a microhabitat - as they need somewhere dark and damp so that they do not dry out</p> <p>Frogs can live in ponds – an example of a microhabitat - as they water in which to lay their eggs (frogspawn)</p> <p>A species is a group of living things have many similarities that can reproduce together produce offspring</p> <p>Changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies</p> <p>Human activity – such as climate change caused by pollution - can change the environment for many living things, endangering their existence</p> <p>The polar bear is a famous example of climate change endangering the existence of a species; as the climate changes and gets warmer, the sea ice on which polar bears live reduces in amount making it harder for them to survive and reproduce</p> <p>Fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there</p>

<p>Sc6/2.3c identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>	<ul style="list-style-type: none"> • Can discuss Darwin's Finches – They are the same animal, but different features. Why? • Can research the work of Alfred Russel Wallace. • Can research and create a fact file in Darwin. • Can, with a picture, research 4 changes they have had to make to adapt to the environment. • Can, with a picture, research 4 ways in which an animal has had to adapt due to climate change. • Can compare two pictures (Rose with thorns and without thorns) • Can identify 4 similarities and differences. • Can compare two trees (one with deep roots (wet climate) shallow roots (dry climate)). • Can identify 4 similarities and differences. • Can explain that animals and plants are all different and that survival changes who and what they are. 	<p><u>New learning and vocabulary</u> evolution, natural selection, variation, advantageous</p> <p>Know that all life on Earth began from a single point around 4.5 billion years ago Know that living things change over time and that this gradual change is called evolution Know that natural selection is the cause of this change; natural selection works as across a species there is natural variation within a species; there is also competition to survive and reproduce and that members of a species with advantageous characteristics survive and reproduce - these characteristics are passed down to their offspring; members of a species with less advantageous characteristics do not survive and reproduce – these characteristics are not passed down to offspring Know that offspring are varied and are not identical to their parents Know that Charles Darwin posited this theory of evolution by natural selection Know that the gradual change of species over millions of years can be observed by looking at examples of fossil</p>
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Year 6 – Summer 1 & 2 – Animals including humans

NC objectives	Ideas for teaching	Key knowledge and vocabulary
<p>Sc6/2.2a identify and name the main parts of the human circulatory system,</p> <p>and describe the functions of the heart, blood vessels and blood</p>	<ul style="list-style-type: none"> • Can identify (through class discussion) that the circulatory system is made up of the heart, blood vessels and the blood itself. • Can briefly explain the parts of the circulatory system to its function. • Can recap that the heart is a muscle. • Can recap that the heart is an involuntary muscle. • Can sort true and false statements into groups of functions of the heart or not functions of the heart. • Can identify (through class discussion) that there are 3 types of blood vessels (Veins, arteries and capillaries) • Can research what each blood vessels job is. • Can identify (through class discussion) the function of blood. • Can research how blood is important for the body. • Can use the diagram of the heart, add arrows on and labels to show the knowledge they have learnt about the functions on the heart, blood vessels and blood (image, word and descriptions to be given) • Can play the Circulation game (STEM) • Can match the definitions of the heart, blood vessels and blood to its name as a recap to the topic. 	<p><u>Big idea(s):</u> B1</p> <p><u>Famous Scientist:</u> William Harvey or Sarah Fowler OBE</p> <p><u>Revision</u> component, energy, growth, survival, nutrients, consumption, skeleton, ribcage, protein, carbohydrate, fat, digestion, skeleton, organ</p> <p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p>Animals, including humans, need food, water and air to survive</p> <p>People need to exercise often to help their body stay strong and fit</p> <p>Keeping clean, including washing and brushing teeth, is an important part of staying healthy</p> <p>There are food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods</p> <p>Proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth)</p> <p>More than half of our diet should be made up of carbohydrates, fruit and vegetables</p> <p>Fats and sugary foods should be eaten rarely and in small amounts</p> <p>Getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet</p> <p>A lack of a nutrient can cause ill health; for example, a lack of vitamin D leads to a disease called rickets</p> <p>Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar</p> <p>NB – some food groups are difficult to afford for some families so sensitivity is required in teaching this area</p> <p>Food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion</p> <p>The process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body</p>

<p>Sc6/2.2b recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p>	<ul style="list-style-type: none"> • From prior year, can identify what a balanced diet is by sorting foods into good food and bad food groups. Some food may go in the middle. • From prior years, can identify the food groups by sorting and matching 30 pictures with their food groups. (Fruit and veg – Apple, pear, pea, cabbage, leek. Carbohydrates – Bread, rice, pasta, cereals. Dairy and alternatives – cheese, milk, yoghurt, cream. Fats – Crisps, sweets, chocolate. Oils and spread – marg, butter, oil. Protein – Fish, chicken, meat, nuts and eggs) • From prior years, can identify how much you should eat of something by matching the segments of the plate to the food group. • Can identify the benefits of exercise (statements given by teacher) • Can identify what a drug is with given statements to sort by teacher. • Can discuss whether all drugs are good. • Can discuss whether all drugs are bad. • Can sort drugs (word and pictures) into groups. • Can identify the effects of drugs. • Can identify that you can be addicted to prescribed drugs so need to be careful. • Can compare different lifestyles (a family who watch TV all day long, eat takeaways and reward themselves with sweets only to a family who play tennis together, make meals from fresh food and have some treats) 	<p><u>New learning and vocabulary</u> artery, aorta, atrium, blood vessels capillary, circulatory system, vein, pulse, ventricle, replenished, resting heart rate, body</p> <p>Know that the heart and lungs are organs protected by the ribcage Know that blood travels around the body transporting nutrients that have been absorbed into the blood stream from digestion; blood also carries oxygen around the body which is used to power the body; this use of oxygen to create energy is called respiration Know that the heart beats, pumping blood around the body and that blood vessels carry the blood; arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins Know that the heart is composed of four chambers: two atria and two ventricles; the aorta is the largest artery in the body and most major arteries branch off from it Know that when we exercise, our heart beats more frequently so that the oxygen that is used around the body can be replenished; it returns to a resting heart rate afterwards; fitter people tend to have lower resting heart rates Know that drugs are chemicals that have an impact on the natural chemicals in a person's; know that drugs can be harmful or helpful, depending on what they are and how they are used; know that all drugs can be harmful if overused Know that paracetamol and aspirin are examples of drugs that can be helpful as a painkiller Know that cannabis and cocaine are examples of illegal drugs that can have serious negative effects Know that alcohol and tobacco are examples of drugs that are legal to adults but that can have serious negative effects, such as liver disease and lung disease, respectively</p>
<p>Sc6/2.2c describe the ways in which nutrients and water are transported within animals, including humans.</p>	<ul style="list-style-type: none"> • Can recap the importance of nutrients for animals inc humans. (Could create a poster to show the importance) • Can recap the digestive system (oesophagus, stomach, small intestine and large intestine – can match the definition to the part) • Can pick 3 food groups (fats, sugars and carbohydrates) identify a range of foods that fall into this category. Identify what the body needs them for. Identify how these travel through the body. • 	<p>NB – note that discussion of drugs needs sensitive teaching due to family circumstances (Link with PSCE Curriculum)</p>