Fairlawn

Scientist Progression Map 2024-25

Knowledge

Table 1: Knowledge can be categorised according to its disciplinary nature and how it is used by an individual

	Substantive knowledge	Disciplinary knowledge
Conceptual... know that... because...	Liquids expand when they are heated (for example, the liquid inside a thermometer).	All measuring instruments, such as a thermometer, have a built-in degree of uncertainty.
Procedural[footnote 73]... know how to... and be able to...	Draw a particle diagram for a liquid.	Use a thermometer to measure the temperature of a solution.

Science program for EYFS

Main Theme	National Curriculum Requirement
Biology: Animals, including humans & Plants	**Personal, Social and Emotional Development** • Know and talk about the different factors that support their overall health and wellbeing: regular physical activity, healthy eating, toothbrushing, sensible amounts of 'screen time' , having a good sleep routine. **Understanding the World** • Explore the natural world around them. • Describe what they see, hear and feel while they are outside. • Recognise some environments that are different to the one in which they live. • Understand the effect of changing seasons on the natural world around them.
	• **BY THE END OF RECEPTION (ELG) that relate to UTW/SCIENCE** **Personal, Social and Emotional Development** Managing Self • Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices. **Understanding the World** The Natural World • 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.
Chemistry	• know ingredients can be combined to make new materials (playdough) • Explore materials can change state when when heated i.e salt dough baking, ice melting.
Physics	• Sort objects into different materials e.g. soft, hard, bendy, metal, plastic • Think of different uses for materials and give reasons why certain materials would be better to achieve certain outcomes.
Working Scientifically	• **Communication and Language** • Listening, Attention and Understanding • • Make comments about what they have heard and ask questions to clarify their understanding.

A scientist is someone who asks and answers questions about the world around them.

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
<u>How can the gingerbread man get across the river?</u> • Select and explore what materials would work to make a boat.	<u>What changes do we notice?</u> • What are the signs of autumn? • Observational drawings of trees in autumn <u>What is Diwali?</u> • Make Coconut Ladoo sweets, combining ingredients and setting in the fridge.	<u>What changes do we notice?</u> • What are the signs of winter? • Observational drawings of trees in winter	<u>What changes do we notice?</u> • What are the signs of spring? • Observational drawings of signs of spring - Daffodils - Blossom on trees <u>What is Easter?</u> • Melting chocolate and making Easter nest cakes.	**<u>What is a Scientist?</u>** • Life cycle of a plant • Observations, describe and name parts of a plant. • Learn what a plant needs to grow • Life cycle of a chicken • Observations of life cycle through seeing the chicken in school and at St Werburgh's farm, having an incubator in class and then caring for the chicks in class. • Life cycle of frog • Observations of frogspawn, tadpoles and (hopefully see froglets and frogs) Naming each part of the cycle. • Life cycle of a butterfly • Observations of caterpillars, chrysalis and butterfly and describe the changes seen.	• <u>What changes do we notice?</u> • What are the signs of summer? • Observational drawings of trees in summer

Understanding the World

- Drawing on children's own personal experiences and sharing these through discussions and circle times e.g. I went to Lyme Regis to a fossil festival! - Can you tell us more about that?
- Asking the children what they are interested in and exploring this through enhanced provision e.g. children want to make potions so adults help select different herbs for them to mix and explore.
- Using our natural environment and planning in the moment e.g. it starts to snow – experiments with snow and ice.
- Continuous provision of sandpit, water trays – children explore independently in learning time and adults support by adding rich language to describe processes e.g. I wonder if it will sink? I can see it's floating on the surface, what might happen if?

Science program for Year 1

There are five main themes in each year group to follow science in Key stage 1 science. The following table sets out the Year 1 units.

Main Theme	National Curriculum Requirement	Curious City Enquiry
Biology: Animals, including humans	Identify, name and compare a variety of common animals including fish (goldfish, tuna shark), amphibians (Frog, newt, toad), reptiles (snake, lizard, tortoise) birds (robin, chicken, penguin) and mammals (human, goat, rabbit) Identify and compare a variety of common animals that are carnivore (lion, owl) herbivores (sheep, gorila) and omnivores (human, dog) Describe, compare and explain the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)	What am I?
Biology: Animals, including humans	Identify, name, draw and label the basic parts of the human body and say which part is associated with each sense. (and explain, what they do) Investigate how height and weight changes as we get older.	
Biology: Plants	Identify and name (**and compare**) a variety of common wild and garden plants (dandelion, rose, daffodil, bluebell, tulip, poppy), including deciduous (sycamore, horse chestnut and oak) and evergreen trees (cedar, holly, fir). Identify and describe (**and group and compare**) the basic structure of a variety of common flowering plants, including trees. Roots, leaves, stem/trunk, flowers	What grows near me?
Chemistry	Distinguish between an object and a material from which it is made Identify and name a variety of everyday materials including wood, plastic, glass, metal, water and rock Describe the simple physical properties of a variety of everyday materials Compare and group together a variety of everyday materials on the basis of their simple physical properties.	What are materials?
Physics	Observe changes across the 4 seasons (Choose a tree to observe throughout the year) Observe and describe weather associated with the seasons and how day length varies. (Observe weather, rainfall and temperature across a two week period in each season using the weather station)	What Season is it?

Year 1 – Working Scientifically – Disciplinary Knowledge

	Asking simple questions and recognizing that they can be answered in different ways	Observing closely, using simple equipment	Performing simple tests	Identifying and Classifying	Gathering and recording data to help in answering questions	Using their observations and ideas to suggest answers to questions
What Am I?	Why do some animals eat meat and others do not? Why is a penguin not a fish? Do all animals eat the same food? Why are animals different colours and patterns? Do all animals hunt? Which of my senses is the most accurate at identifying food?	Comparing animals in different classification groups what is the same, what is different? Senses investigation with food How does my height change over the year?	Senses investigation with food How does my height change over the year?	Sorting animals into different groups based on visible characteristics (allow children to use own ideas e.g. all these animals can fly, all these animals live in water) Correctly sorting animals into main classification groups and understanding why they fit into these groups What are the names for our body parts – what senses are they linked to?	Labelled diagram of face, body parts and associated senses Pictures and comments recorded from senses investigation (food) Sorting pictures of animals into main groupings and explain what is similar about the animals in that group Sorting animals by what they eat	Allow children to make own groupings of animals – understand their reasoning Do all animals have the same senses as we do?
What grows near me?	Why do some trees still have leaves in winter? How does the tree change over the year? Why are flowers different colours?	Careful observation of what plants grow in the local area – drawing pictures How does the oak tree change over the year? Which tree has the biggest leaves?	How does my sunflower change each week? How does this tree change over the year?	Sorting and identifying plants/leaves collected Understanding deciduous/evergreen	Drawings or labelled photographs to identify a range of plants Sorting trees into deciduous/evergreen	Why do some trees lose their leaves in winter and some do not? Why do some plants have flowers? Which sunflowers grew the tallest? What do we need to give plants for them to grow?
What is my hat made of?	What is my book made from? (and other things in classroom and surrounding area) What material would be best to make a waterproof hat? What are the most common materials we can find in our classroom? Which materials can be recycled?	Observe what happens when water is poured onto different materials – which would make the best waterproof coat? What happens to materials over time when we bury them? Which materials are the most flexible?	Observe what happens when water is poured onto different materials – which would make the best waterproof coat? Does our sense of smell get better when we cannot see?	Compare materials and sort into groups based on characteristics and properties (e.g. which are waterproof, which are not; shiny, rough etc)	Writing to explain what an object is, what is made from and property of that material Compare materials using prepared table to decide which ones let the water through and which would be best for a waterproof coat	Choosing appropriate materials to make their own hat depending on its purpose
What seaon is it?	Why do we wear warm coats in winter and not in summer? Why does an ice cube melt quicker in summer than in winter? Does more rain take longer to dry? What colours can we find outside? Does this change in different seasons? What would happen if there was too much rain? What would happen if there wasn't enough rain?	Observation walks during 4 seasons – noting differences Weather diaries In which season does it rain the most? Does the wind always blow the same way?	Investigate how long an ice cube takes to melt in different seasons What colour are the leaves on trees in the four seasons Ice cube melting in winter/summer Is there a pattern in where we find moss growing around school? How does my plant change each week?	Compare living things visible during the different seasons Which season is the rainiest?	Sorting pictures and names of months of the year into correct season groupings Drawings to show colours of leaves/plants visible in different seasons Weather diaries Time for ice cube to melt	Why does the ice cube melt faster in the summer than in the winter (it is warmer, there is more sunlight)

Year 1

Working Scientifically

What am I?	What grows near me?	What is my hat made of?	What changes around me?
Allow children to group animals based on their own sorting criteria Children to correctly group animals into main classification groups (bird, mammal, fish, amphibian, reptile) Children to sort animals into carnivore, omnivore, herbivore Senses investigation – food. What does it smell like, taste like etc. Record children's observations through pictures and comments.	Observation walks Drawings of plants spotted, labelled with parts Naming pictures of common plants Explanation of deciduous/evergreen	Writing to explain what an object is, what is made from and property of that material Compare materials using prepared table to decide which ones let the water through and which would be best for a waterproof coat	Sorting pictures and names of months of the year into correct season groupings Drawings to show colours of leaves/plants visible in different seasons Weather diaries Time for ice cube to melt

Progression in recording Science Y1

Evidence of experiments led by class teacher
Evidence in the form of:

- Photographs
- Drawings
- Comparison tables (2 columns)
- Sorting circles
- Simple bar charts

Science program for Year 2

There are four main themes in each year group to follow science in Key stage 1 science. The following table sets out the Year 2 units.

Main Theme	National Curriculum Requirement	Curious City Enquiry
Biology: Animals, including humans	• Find out about, describe and explain the basic needs of animals including humans (water, food, air) • Describe the importance for humans of exercise, eating the right amounts of different food types and hygiene.(fruit and vegetables, carbohydrates, proteins, dairy, fats)	How do we live a healthy life?
Biology: Living things and their habitats	• notice that animals, including humans, have offspring which grow into adults. (comparing different species: humans, baby, toddler, child, teenager, adult, elderly / Common frog (spawn, tadpole, lizard) / Robin: egg, chick, robin / Lizard: egg, hatchling, lizard) • Explore and compare the differences between things that are living, dead and things that have never been alive. • Identify that most living things live in habitats to which they are suited (research hedgehog, cactus, penguin) and describe how different habitats provide the basic needs of different kinds of animals and plants and how they depend on each other. • Identify and name a variety of plants and animals in their habitats (woodland, urban, arctic) including microhabitats (flowers, under leaves, in soil) Group animals based on their natural habitats / micro habitats	What is home?
	• 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. (producer – consumer (herbivore) - consumer (carnivore)	How do we live a healthy life?
Biology: Plants	• Observe and describe (**and explain**) how seeds and bulbs grow into mature plants (**and compare different species**). • Seed/bean – germination – roots – leaves – flowers – fruit – seed dispersal – dies • Investigate (**and explain**) how plants need water, light and a suitable temperature to grow and stay healthy (**and suggest how plants can adapt to their environment**)	How do plants grow?
Chemistry	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Investigate how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	What could my school be made of?

Year 2 – Working Scientifically - Disciplinary Knowledge

	Asking simple questions and recognizing that they can be answered in different ways	Observing closely, using simple equipment	Performing simple tests	Identifying and Classifying	Gathering and recording data to help in answering questions	Using their observations and ideas to suggest answers to questions
How do we live a healthy life?	*What is the difference between being healthy and just being alive?* *Why do I need to eat vegetables?* *Will my arm span be the same as my height when I am an adult?* *Why are we all different heights?* *What food do we need to stay healthy and why?*	*Taking measurements to investigate human body (e.g. arm-span and height, foot length and fore-arm)* *How much food and drink do I eat over a week?*	*How much food and drink do I eat over a week?* *Which age group of children wash their hands most in a day?* *What is the most popular soup flavour?* *What colour foods are most popular in our class? Is this different to our teachers?*	*Sorting foods into categories (carbohydrates/proteins etc.)*	*Tally chart/pictogram of favourite soups* *Sorting rings/eatwell plate of food types* *What food group do I eat most of in one week (e.g. tally chart from food log)*	*What food do you need in a healthy diet and why?* *Do you think our favourite foods change as we get older?*
What is home?	*Why don't polar bears live in deserts?* *What is a badger's home called?* *Why do some animals have underground homes?* *Why do we not see foxes much in the daytime?* *Do all animals grow and live in the same way?* *Which animals hunt, and which are hunted? Why?* *Why do animals and plants like to live in particular places?* *How do seasons affect our animals and plants?* *Which animals hibernate and why?*	*Observation of microhabitats and the animals that can be found in them* *Close observation of the bodies of animals to sort them into groups* *How does a tadpole change over time?* *How does our school garden change over time?*	*Do amphibians have more in common with reptiles or fish? (comparative test)* *What conditions do woodlice prefer to live in?* *Where can we find the most worms?*	*Which homes belong to which animals?* *Which offspring belong to which animal?* *How can we sort these animals? (allow children to sort animals themselves (e.g. nocturnal/diurnal, types of animal, those that can fly/those that live underwater etc)* *Grouping alive, dead, never alive*	*Sorting rings for alive, dead, never alive* *Table to compare fish, amphibians and reptiles (what is the same, what is different)* *Tally chart of where woodlice are found* *How could we group these animals based on their habitats?*	*Create an appropriate home for an animal and explain why it is suitable* *Why do we not see some animals in the daytime?* *How are the animals in Australia different to the animals in the UK?*
How do plants grow near me?	*Do all plant seeds look the same?* *How do seeds turn into plants?* *What do plants need to grow?* *How long are the roots of tall trees?* *What are flowers for?* *Do all plants produce flowers and seeds?*	*Observing plants over time to see the changes* *Identifying what the most common plants in the local area are*	*Testing what happens to plants over time grown under different conditions (comparative test)* *Do cress seeds grow quicker outside or inside?* *Do bigger seeds grow into bigger plants?*	*How can we identify the trees/plants that we spotted on our walk (shape of leaves/flowers etc)* *How can we sort plants into different groups (e.g. evergreen/deciduous, plant/tree)*	*Tally chart of plants spotted to find most common plant in local area* *Drawings over time to note changes in plant* *Sorting leaves of plants (e.g. spiky/smooth edges)*	*What should I do to grow a healthy plant?* *How does a cactus survive in a desert with no water?*
What could my classroom be made of?	*Why don't we make windows out of wood?* *What will happen to the shape of a piece of cardboard if I twist it?* *How have the materials we use changed over time?* *How can we change materials?* *How are plastics made?*	*What are the most common materials used for building houses in our local area?* *Which material is heaviest?*	*What shapes make the strongest paper bridge?* *Which materials will float and which will sink?* *Can I bend it, twist it etc (material manipulation)*	*Grouping materials into natural man-made* *Grouping materials by properties* *Grouping objects by the material that they are made from*	*Tick sheets of material manipulation* *Pictogram/tally chart/block graph to represent most common used materials in building* *Venn diagrams for material sorting*	*Choosing the best materials for building – why are they appropriate*

Year 2

Working Scientifically

How do we live a healthy life?	What is home?	How do plants grow near me?	What could my classroom be made of?
Writing food chains Sorting food into food groups Drawing to explain the importance of exercise, healthy eating and hygiene Labelled picture of the human body – which is the most important part? Measuring body parts to investigate human body (e.g. feet, height, armspan) – spotting any patterns.	Sorting into dead/alive/never alive (explanations as to why) Identifying where animals are found around local area Identifying animals and their offspring Identify and name animals and their habitats, sorting sheets to put animals into the correct habitats Research a habitat and what animals live there Create home for an animal and explain why it is suitable	Growth experiment, recording results over time to see what happens to beans as they grow over time in different conditions. Simple comparison (light/dark, cold/warm) Prediction of what they think will happen Diary of results with pictures and annotations Short written conclusion	Materials manipulation investigation (can I bend I, twist it, stretch it, squash it) Explain which materials would be most useful for particular jobs based on properties Naming and identifying different pictures of different materials and their properties/grouping and classifying them based on properties Identifying common building materials Making classroom and explaining material choices

Progression in recording Science Y2

Evidence of experiments as part of a class
Evidence in the form of:

- Photographs
- Drawings
- Comparison tables
- Simple bar charts
- Labelled diagrams
- Simple explanations/statements

Evidence of a prediction (this could be in a thought bubble template, before a photograph of the experiment or results from the experiment)

Science program for Year 3

There are five main themes in each year group to follow science in Key stage 2 science. The following table sets out the Year 3 units.

Main Theme	National Curriculum Requirement	Curious City Enquiry
Biology: Animals, including humans	Identify and explain that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat **(for specific processes within the body)** Identify that humans and **(a range of)** some other animals have skeletons and muscles for support, protection and movement. Investigate: do male humans have bigger skulls that females?	What is the difference between surviving and being healthy?
Biology: Plants	Identify and describe (**and explain**) the functions of different parts of flowering plants (petal, stamen, carpel, sepal) (**and how they connect together using scientific vocabulary**). Investigate (**assess and test**) the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how (**evaluate**) they vary from plant to plant. Investigate the way in which water is transported within plants (comparing different species). Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and research seed dispersal (gravity – horse chestnut; wind - sycamore, dandelion; bursting- poppy, pea; water – coconut; by animals carrying or eating – apple, acorn)	How do plants die?
Chemistry: rocks	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Research how fossils are formed and different types of rocks are formed. Recognise that soils are made from rocks and organic matter	What is underneath our feet?
Physics: light	Recognise that they need light in order to see things and that dark is the absence of light Notice that light is reflected from surfaces Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Recognise that shadows are formed when the light from a light source is blocked by an opaque object Investigate which materials let light through (opacity and transparency) Find (and investigate) patterns in the way that the size of shadows change.	Where does the darkness come from?
Physics: forces and magnets	Compare how things move on different surfaces. Compare materials based on the amount of friction they generate. Notice that some forces need contact between two objects, but magnetic forces can act at a distance Observe how magnets attract or repel each other and attract some materials and not others Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet and identify some magnetic materials. (scissors, paper clips, hairgrips) Describe magnets as having two poles	How can you feel the force?

Year 3 – Working Scientifically - Disciplinary Knowledge

	Asking relevant questions and using different types of scientific enquiries to answer them	Making systemic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment including thermometers and data loggers	Setting up simple practical enquiries, comparative and fair tests	Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions Recording findings using simple scientific language, drawings, labelled diagrams, key, bar charts and tables	Using straightforward scientific evidence to answer questions or to support their findings	Identifying differences, similarities or changes related to simple scientific ideas and processes Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions	Reporting on findings from enquiries including oral and written explanations, displays or presentations of results and conclusions
What is my body made up of?	*Why do we need a skeleton?* *What different types of skeleton are there?* *Are all skeletons the same?* *Can a living thing survive without a skeleton?* *How do we move?* *Are some bones bigger than others?* *Are some bones stronger than others?* *What happens when we break a bone?* *Why do we need joints?* *Why do muscles get tired?* *Can we 'break' muscles?*	*How does our skeleton change over time* *Measuring circumference of skull*	*Do male humans have larger skulls than females?*	*When do I have the most energy throughout the day?* *How do the skeletons of different animals compare?* *Table to record skull circumference data* *How does the angle that your elbow/knee is bent affect the circumference of your upper arm/thigh?* *Labelled diagram of human skeleton, with correct names for bones*	*Explain the purpose of different bones (movement, protection)* *Explain results from circumference data*	*Identify difference between skeletons of humans and other animals – notice similarities between different groups of animals*	*What is a healthy diet and why is it important – information poster* *Explain purpose of different parts of human skeleton*
How do plants die?	*How do plants reproduce?* *Do all flowers look the same?* *How do insects know which flowers to pollinate?* *How does water move through a plant?* *Do grasses and trees have flowers?* *Why do flowers smell?* *How does light affect plant growth?* *What do seeds do?* *What conditions are perfect for a plant to grow?* *Can a plant grow without its leaves?* *What are all the different ways in which seeds can be dispersed?*	*Measuring plant growth over time and making notes on plant appearance* *What happens to celery when it is left in a glass of coloured water?* *How do flowers in a vase change over time?*	*Children to choose how to set up experiment to understand which conditions are best for plant growth – understanding that they are changing one variable and keeping the rest the same* *How does changing the length of a carnation stem affect how long it takes food colouring to reach the flower's petals?*	*Record height of plants over time* *Children to record evidence using bar chart (measurements recorded in table by teacher)*	*Seeds need water to germinate. Plants need water to survive* *Understanding that plants can germinate in the dark but need light to continue to be healthy* *What colour flowers do pollinating insects prefer?*	*Understand that plants can germinate in the dark. Plants grown in the dark will end up thin, tall and pale in colour. Healthy plants will be green.* *How could we change the experiment next time?* *Was there anything that didn't work very well (e.g. trying to stop air getting to the plant – how do we water it?)* *Do bigger seeds need more water than smaller seeds? (extension)*	*Write a guide to keeping a plant healthy using knowledge learned from enquiry*
What is underneath our feet?	*How are soils different?* *Why is soil important?* *How old are rocks?* *What are rocks made from?* *How do rocks change?* *How are fossils made?*	*Which soil absorbs the most water? (drainage)* *How does adding sand to soil affect how much water will drain through it?* *What happens to a rock over time when we tumble it?* *What happens when we put a sample of soil in water, shake it and then leave it to settle?* *Identifying rocks using identification keys.*	*Which soil absorbs the most water? (drainage)* *How does adding sand to soil affect how much water will drain through it?* *What happens to a rock over time when we tumble it?* *What happens to these rocks when I pour vinegar on them?* *What happens to these rocks when I try and mark them with a pin?* *Which rocks float? Which rocks sink?*	*Recording amount of water draining through soil in set time* *Recording what happens when set amount of sand is added to soil and water poured through* *Diagram of separated soil sample in water – layers* *Diagrams of volcanoes* *Recording knowledge of different types of rock and what they look like*	*Explaining how amount of sand affects water drainage* *Explaining how fossils are formed – use evidence to explain how we know what animals in the past looked like*	*Compare different rocks using evidence gathered* *Compare soils using evidence gathered* *Identify where in the world most volcanoes are found and relate to tectonic plates*	*Model volcanoes explaining how they work* *Written diagrams to explain model fossil formation* *Diagram to explain soil structure* *Where does the darkness come from?* *Written report for light experiment*
Where does rhe darkness come from?	*How does distance from a light source affect how bright it is?* *How does being in darkness affect your sense of hearing?* *How does the thickness of a material affect how much light is let through?* *How are shadows made?* *How can we change the size and shape of a shadow?* *Why does white paper reflect light but black paper does not?* *Do brighter lights make darker shadows?*	*Measure how the size of a shadow changes as the light source is moved further away from an object* *Notice what happens when light is shone on a reflective surface and when it is not* *Where in our classroom is darkest?*	*Measure how the size of a shadow changes as the light source is moved further away from an object* *Notice what happens when light is shone on a reflective surface and when it is not* *Which materials let light through and which do not?*	*Drawing diagram to explain set up for shadow experiment – explain findings* *Sorting materials into transparent, translucent and opaque* *Sorting light sources into natural and man-made/light source or not a light source*	*Explain what happens to the size of a shadow the further away and object is from a light source* *Explain which materials are best suited for different purposes based on their ability to let light through*	*Write conclusion for shadow experiment – use values to make predictions for more values, ask further questions*	*Model volcanoes explaining how they work* *Written diagrams to explain model fossil formation* *Diagram to explain soil structure* *Where does the darkness come from?* *Written report for light experiment*
How can you feel the force?	*What are magnetic materials? How can we find out?* *How close does a magnet have to be before it attracts a magnetic material?* *How far away can the magnetic attraction between two magnets be experienced?* *What surfaces are more slippery, which are more 'sticky'?* *Are bigger magnets stronger than smaller ones?*	*How is the magnetic attraction of repulsion force affected by putting materials between the magnets?* *How far will a car travel down a slope made of different materials?* *How far away can the magnetic attraction between two magnets be experienced?* *Which materials are magnetic, which are not?* *Which sides of a magnet will attract together, which will repel?*	*How is the magnetic attraction of repulsion force affected by putting materials between the magnets?* *How far will a car travel down a slope made of different materials?* *How far away can the magnetic attraction between two magnets be experienced?* *Which materials are magnetic, which are not?* *Which sides of a magnet will attract together, which will repel?* *How does the size and shape of a magnet affect how strong it is?*	*Record examples of which materials are magnetic and which are not in a table/venn diagram* *Record how close magnets need to be before they attract/repel each other* *Record how far cars travel down ramps made of different surfaces*	*Children understand that rougher surfaces create more friction and slow objects down* *Children understand that same sides repel and opposite sides attract*	*Children come up with new value for how far a car would travel on another surface* *Children predict whether different materials will be attracted towards a magnet or not*	*Written conclusions to explain the results of their experiments*

Year 3

Working Scientifically

What is the difference between surviving and being healthy?	How do plants die?	What is underneath our feet?	Where does the darkness come from?	How can you feel the force?
Measuring and comparing body parts (arm-span – height) Measuring skull circumference and comparing male/female Labelling skeleton and identifying purpose of bones (protection, movement) Compare skeletons of animals – identify similarities and differences in groups of animals Recording energy levels throughout the day – what affects it? Create healthy diet information display	Growing plants under different conditions (changing one variable, keeping all others the same) – water, light, soil and recording height and appearance of plant over time Record information from plant growth using bar chart Recoding what happens to carnations over time in coloured water Change length of stem for carnations – does this affect the length of time it takes flowers to change colour?	Sample of soil in water bottle – shake and then allow to settle to see the separated layers Soil drainage experiments – which soil absorbs the most water, timed to see how much water drains through in a set time Experimenting with increasing the amount of sand in a soil mixture and how this affects drainage. Set time and amount of water pour in. Rock properties experiment – observe visual properties, what happens when we drop vinegar on the rock, what happens when we try and mark the rock with a pin, what happens when we put the rock in water, does it float/sink, what happens when we test the rock with a magnet Create model volcanoes	Experiment to see how the size of a shadow changes when the light source is moved away from an object. Test which materials allow light through (opaque, translucent, transparent) Experiment to see what happens when light is shone on a reflective surface – tin foil 'moon' in a cardboard box – shine light through hole, children to look through different hole and see what happens	Explore which materials are magnetic and which are not Explore like poles repelling, opposites attracting. Place objects between magnets – does this change what the magnets are able to do? Experiment how close magnets have to be before they attract each other Does the size of a magnet make is stronger? – How many paper clips can you get to hang from a magnet. Friction experiment – rolling cars down slopes with different surface, how far do the cars travel. Can children think of a different material to test and predict what might happen?

Progression in recording Science

Evidence of experiments as part of a class and in a small group

Evidence in the form of:

- Photographs
- Drawings
- Comparison tables
- Simple bar charts
- Labelled diagrams
- Written investigations

Written scientific reports with:

- A prediction
- Identification of what has changed in the experiment and what has stayed the same
- Results
- A conclusion

Science program for Year 4

There are five main themes in each year group to follow science in Key stage 2 science. The following table sets out the Year 4 units.

Main Theme	National Curriculum Requirement	Curious City Enquiry
Biology: Animals, including humans	• **Research** the different body part involved in digestion (mouth, oesophagus, stomach, large intestine, small intestine, anus) and describe the simple basic functions of the basic parts of the digestive system in humans. • Identify **(and compare)** the different types of teeth (incisor, canines, molars, premolars, wisdom) in humans and **(explain)** their simple functions **(comparing them with animal examples** – elephant (herbivore), lion (carnivore) • Construct and interpret a variety of food chains, identifying producers, predators and prey. (grass, cow, human insect, lizard, bird of prey)	Why are more people becoming vegetarian?
Biology: Living things and their habitats	• Recognise that living things can be grouped in a variety of different ways **(and suggest valid reasons why)** (verterbrates – mammals, fish, birds, reptiles, amphibians; inverterbrates – insects, spiders, worms, slugs, snails) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. • Recognise that environments can change and that this can sometimes pose dangers to living things **(using specific examples)** Research the effect of climate change on animals around the world.	How is plastic impacting our planet?
Chemistry: states of matter	• Compare and group materials together, according to whether they are solids ,liquids or gases • Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. Research the water cycle.	Where does our water come from?
Physics: sound	• Identify how sounds are made, associating some of them with something vibrating (chladni plate, boom box, different musical instruments) • Recognise that vibrations from sounds travel through a medium to the ear • Find (observe & evaluate) patterns between the pitch of a sound and features of the object that produced it. Compare how length and width of tubes (straw flutes) affect pitch. Investigate how pitch can be changed by shortening the string, size / shape of instrument, thickness of string tightness etc. • Find patterns between the volume of a sound and the strength of the vibrations that produced it • Recognise that sounds get fainter as the distance from the sound source increases. Investigate what happens to volume over distance.	How does sound make music?
Physics: electricity	• Identify common appliances that run on electricity (mains powered: tv, toaster, fridge, battery: ipad, phone, torch) • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • Identify **(predict and explain)** 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 **(and fix a disconnected circuit)** • Recognise **(and explain why)** that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit **(using scientific terminology)** • Investigate which materials are electrical conductors or insulators, recognise some common conductors and insulators, and associate metals with being good conductors. **(and explain why)** Classify / group materials into conductors and insulators.	How can we switch off?

Year 4 – Working Scientifically - Disciplinary Knowledge

	Asking relevant questions and using different types of scientific enquiries to answer them	Making systemic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment including thermometers and data loggers	Setting up simple practical enquiries, comparative and fair tests	Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions Recording findings using simple scientific language, drawings, labelled diagrams, key, bar charts and tables	Using straightforward scientific evidence to answer questions or to support their findings	Identifying differences, similarities or changes related to simple scientific ideas and processes Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions	Reporting on findings from enquiries including oral and written explanations, displays or presentations of results and conclusions
Why are more people becoming Vegetarian?	*What different types of food are there?* *Why do we eat a variety of different things?* *Do all organisms eat the same things?* *Why do some people need different diets (e.g. weightlifter vs. marathon runner)?* *Why are teeth important?* *Do different teeth have different jobs?* *What happens to our food when we eat it?* *What is our digestive system?*	*How does an eggshell change over time when left in coca-cola?* *How can we organise teeth into groups?* *What are all the names for the organs of the digestive system?* *How much meat do we eat in one week? – record amount each child eats*	*In our class, are omnivores taller than vegetarians?* *Are foods that are high in energy always high in sugar?*	*Table to show heights of children* *Labelled diagram of digestive system* *Labelled diagram of teeth* *How many red+purple meals are made compared to green in the school kitchen?* *Explanation over time of appearance of egg* *Total amount of meat eaten in a week – table* *Calculate food miles for a dish of food*	*Are vegetarians shorter than omnivores in our school?* *What happens to the egg over time – why?*	*Identify differences between teeth – explain the function of each different type* *Would our data be different if we included adults?*	*Labelled diagram of digestive system* *Labelled diagram of teeth* *Poster to show how many meals are eaten each week* *Report to show how much meat is eaten by class each week*
How is plastic impacting our planet?	*What food chains and webs are there in our local environment?* *How does energy move through the food chain?* *How does the removal of one animal from a food chain affect all the others (keystone species)?* *What are the most important things we could do to improve our local area?* *How can we group animals – classification – in different ways?*	*Investigate what invertebrates can be found around the school site*	*How can we classify the animals we find around the school site?*	*Investigate what invertebrates can be found around the school site – create a classification map* *What are the most endangered animals in the UK?* *What are the most endangered animals in the world?* *What makes animals endangered?*	*What are the most endangered animals in the UK?* *What are the most endangered animals in the world?* *What makes animals endangered?* *What do the animals we found in the school site eat?*	*Where do we find the most invertebrates around the school site?* *What kind of invertebrate do we find the most of?*	*Create display poster about endangered marine animal, what risks it faces and how we can help*
Where does our water come from?	*What are solids, liquids and gases? How are they different?* *What happens to a glass of water when you leave it on a windowsill?* *Where do ice cubes go when they disappear?* *Why does it rain, snow, hail?* *Does seawater evaporate faster than freshwater?* *What is the melting temperature of ice?* *What temperature does water freeze at?* *Why does chocolate melt when I hold it in my hand?* *Why do windows sometimes go foggy?*	*How does the mass of a block of ice affect how long it takes to melt?* *What temperature does water freeze/ice melt?* *Does salt water take a different time to evaporate than fresh water?* *Is there a pattern to how long it takes different sized ice cubes/lollies to melt?* *Classifying materials based on properties*	*How does the mass of a block of ice affect how long it takes to melt?* *What temperature does water freeze/ice melt?* *Does salt water take a different time to evaporate than fresh water?* *Is there a pattern to how long it takes different sized ice cubes/lollies to melt?*	*Record findings of melting experiments – recording mass of ice and time to melt* *Record how adding salt affects time for evaporation to occur – graphs* *Recording sorting materials based on properties* *Labelled diagrams of states of matter and how temperature affects this* *Diagram of water cycle*	*Use evidence from experiments to explain how materials change state and what affects this – mass, temperature, materials*	*Predict what would happen with different values of mass/amount of salt in experiments giving answers in line with data gathered and scientific understanding* *Evaluate where there might be aspects of experiment that are not that reliable*	*Written diagrams of the water cycle, explaining what happens at each point in the cycle using correct terminology*
How does sound make music?	*How are sounds made?* *How can you change the volume of a sound?* *Which materials vibrate better and produce louder sounds?* *How does the length of a straw affect the pitch of the sound made?* *How does the thickness of a material affect how well it blocks a sound?* *Can we see sound?* *Are two ears better than one?* *Can we all hear the same sounds?* *Do all animals have the same hearing range as us?*	*What happens to the volume of a sound the further away you are from the source?* *How does the length of a straw affect the pitch of the sound it produces?* *How does sound travel to our ears?*	*What happens to the volume of a sound the further away you are from the source? (which variables are we changing/keeping the same?)* *How does the length of a straw affect the pitch of the sound it produces?* *How does sound travel to our ears?*	*Record data in simple table from volume experiment and write conclusion* *Explain what variables we are keeping the same and which we are changing*	*Explain that sounds are quieter the further you get from the sound source and explain why (sound waves)* *Explain which mediums sound will travel best through*	*What happens to the volume of a sound the further away you are from the source – suggest new values – suggest improvements* *How does the length of a straw affect the pitch of the sound it produces – what would happen if we changed the material of the straw?*	*Written reports on scientific investigations* *Create a musical instrument and evaluate it*
How can we switch off?	*What would life be like without electricity?* *What sort of things use electricity?* *In what ways can we 'get' electricity?* *How do we make electricity?* *How do batteries work?* *How quickly do batteries run out? Does it change with a different number of components?* *What materials carry electricity?*	*How long do the batteries in a torch last for?* *What happens to the brightness of a bulb if we add more cells to a circuit?* *Which room has the most electrical sockets in my house?* *How many different objects can I spot in one room that require electricity to work?*	*How long do the batteries in a torch last for?* *What happens to the brightness of a bulb if we add more cells to a circuit?* *Which material is the best conductor of electricity?* *How does the thickness of the conducting material affect how bright a bulb is?*	*Labelled diagrams of working and non-working circuits; children able to identify that circuit must be closed* *Tables to show which materials are conductors and which are not* *Table to show how long torch light stays on*	*Labelled diagrams of working and non-working circuits; children able to identify that circuit must be closed* *Tables to show which materials are conductors and which are not – children able to understand which is which*	*Children can draw working circuits with different numbers of parts and are able to tell which will work and which will not* *Children can look at circuits and identify which ones will have brightest bulbs (more cells) and explain why*	*Create a poster/campaign about how we can save electricity – understanding standby mode and switching things off at the plug*

Year 4

Working Scientifically

Why are more people becoming vegetarian?	How are plastics impacting our planet?	Where does our water come from?	How does sound make music?	How can we switch off?
Place hard boiled eggs in water, coca-cola and vinegar for a week and see what happens Measure height of children in class and compare data for vegetarians and omnivores Digestive system experiment with biscuits/orange juice Tallying up how much meat is eaten in school across a week	Investigate the invertebrates found in the school site/local nature reserve – where do we find them, what do we find the most of, how do we classify them? Children learning to use simple classification keys to identify invertebrates Researching endangered animals in the UK and beyond	Salt water vs. fresh-water evaporation over time – recording difference with differing amounts of salt dissolved in water Different weight ice-cubes – measure time taken to melt What happens when we put salt onto ice cubes? Do they melt faster or slower? Water cycle in a bag experiment	Progressively change length of straw 'reed' – how does this impact the pitch? How does the volume of a sound change as you move further away from the sound source? – measure decibels Place black paper and sugar on top of speaker to visualise sound vibrations Air cannon experiment with model of the ear to show how sounds reach ears	Investigate how long the batteries in a torch last for Children to investigate which rooms in their homes contain the most electrical sockets/devices Experimenting with circuits to understand how they have to be complete and closed to work What happens to a bulb in a circuit if we add another cell? Which materials are conductors/insulators?

Progression in recording Science

Oral reports on findings (photographs and comments/post-it notes)
Evidence of experiments as part of a class and in a small group
Evidence in the form of:

- Photographs
- Drawings
- Labelled tables
- Labelled bar charts
- Labelled diagrams
- Written investigations

Written scientific reports with:

- A prediction
- Identification of what has changed in the experiment and what has stayed the same
- Results
- A conclusion
- An evaluation of the experiment

Science program for Year 5

There are five main themes in each year group in Key stage 2 science. The following table sets out the Year 5 units.

Main Theme	National Curriculum Requirement	Curious City Enquiry
Biology: Animals, including humans	• Describe **(using examples and scientific terminology)** the changes as humans develop to old age • Research changes in humans at different stages in our lives.	How are you helping to save our planet?
Biology: Living things and their habitats	• Research and describe **(and compare and contrast)** the differences in the life cycles of a mammal (human) an amphibian (frog), an insect (butterfly) a bird (robin) and a reptile (tortoise) • Describe the life process of reproduction in some plants and animals **(using specific examples to identify their similarities and differences)**	
Chemistry: changes in materials	• Compare and **group (and evaluate)** together everyday materials on the basis of their properties, including hardness, solubility, transparency, conductivity, (electrical or thermal), and response to magnets. • Know that **(and explain why)** some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Investigate which materials will dissolve and investigate effect of temperature on dissolving, recover a solute – salt) • Use knowledge of solids, liquids and gases to decide **(and explain)** how mixtures might be separated, including through **(multiple steps of)** filtering, sieving and evaporating. Investigate different ways of separating materials. • Give **(justified)** reasons based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. • Demonstrate **(and explain why)** that dissolving, mixing and changes of state are reversible changes • Explain that some **changes** result in the formation of new materials and that this kind of change is not usually reversible. Investigate reversible and irriverisble changes in cooking.	How can science help the homeless?
Physics: Earth and Space	• Describe the movement of the Earth, and other planets, relative to the Sun in the Solar System (and research how their orbits vary in length and shape) • Describe the movement of the moon relative to the Earth • Describe the sun, earth and moon as approximately spherical bodies Compare the distance a planet is from the Sun and it temperature. • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky **(and the different time zones across the planet)**	What does the Earth look like from the Solar System?
Physics: Forces	• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object **(and the size of the planet has a direct effect on the strength of gravity)** • Identify **(and explain)** the effects of air resistance, water resistance and friction, that act between moving surfaces **(making links to investigations)** • Recognise that **(and explain why)** some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect	What do forces actually do?

Year 5 – Working Scientifically - Disciplinary Knowledge

	Planning different types of scientific enquiries to answer questions, including recognizing and controlling variables where necessary	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat reading when appropriate	Planning different types of scientific enquiries to answer questions, including recognising and controlling variable where necessary	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	Identifying scientific evidence that has been used to support or refute ideas or arguments	Reporting on findings from enquiries including oral and written explanations, displays or presentations of results and conclusions	Using test results to make predictions to set up further comparative and fair tests
How are you helping to save the planet?	*What is a life cycle?* *What types of life cycles are there?* *Are life cycles the same?* *Do plants reproduce in the same ways as us?* *How do plants spread their seeds?*	*How does a bean change during germination?* *Is there a relationship between the number of petals and the number of stamens?*	*Is there a relationship between the number of petals and the number of stamens on a flower?* *What do we throw away most of in school?*	*Compare animals based on their life cycles* *What are the differences between a mammalian life cycle and an insect?* *Comparing number of petals and number of stamen* *Order, label and compare animal and plant life cycles*	*What is the worst pollutant for the environment?* *How have humans impacted the environment?* *What are individuals doing to help?*	*Present ways we could help the planet – create a product that could help* *Explanation of the life-cycle of an animal and including where that part of the life-cycle takes place*	*What can we do to help our local environment – what will make the greatest impact?* *Do all plants and animals reproduce in the same way?*
How can science help?	*What are mixtures?* *What does dissolve mean?* *Which of the following dissolve in water: sugar, bicarbonate of soda, oil, chocolate, coffees, dark vinegar and wax?* *How does the amount of water used affect how much sugar will dissolve in it?* *Which sweets dissolve in water?* *How can we separate mixtures?* *How can we clean our dirty water?*	*How does the temperature of tea affect how long it takes for a sugar cube to dissolve?* *Which type of sugar dissolves the fastest?* *What materials dissolve when we put water on them – biscuits, coffee, flour, cocoa, oil, sugar, cereals*	*How does the temperature of tea affect how long it takes for a sugar cube to dissolve?* *Which type of sugar dissolves the fastest?* *What materials dissolve when we put water on them – biscuits, coffee, flour, cocoa, oil, sugar, cereals* *How can we separate mixtures?* *Which materials would be best to create an insulating blanket?*	*Recording impact on temperature of dissolving sugar* *Recording which materials dissolve – simple table* *Sorting materials based on properties – Carroll diagrams to show similarities/differences* *Identifying when we can tell if chemical changes are reversible*	*Researching new materials and how the materials that we use have changed over time* *Understanding which materials are best suited to different conditions based on their properties*	*Evaluate experiments to say which could be made more accurate* *Design a pack to help people affected by a natural disaster – what could be used to clean the water? What could be used to keep people warm and dry? What would be the best food if it was hot/wet in the country?*	*Predict what might happen with other materials when they have water put on them – will they dissolve?*
What does the Earth look like from the Solar system?	*How does temperature/size/day length/year length change as you get closer/further to the sun?* *How does distance from a light source affect how much light hits an object?* *Does having more moons result in more light hitting a planet?* *Why do we have day/night/months/years/seasons?* *Why does day length change?* *Why does shadow size change over the course of a day?*	*Testing what happens to a shadow when the sun moves across the sky (measure length)* *How does the length of daylight hours change through the seasons (research)*	*Testing what happens to a shadow when the sun moves across the sky (measure length)* *How does the length of daylight hours change through the seasons (research)*	*Testing what happens to a shadow when the sun moves across the sky (measure length)* *How does the length of daylight hours change through the seasons (research)* *Observe and identify the phases in the cycle of the moon* *Is there a pattern between the size of a planet and the amount of time it takes to orbit the sun?*	*How have our ideas about the Solar System changed over time?* *Understanding the space race – competition to get to the moon* *How do astronomers know what stars are made from?*	*Create a space documentary to explain knowledge gained about the Solar System – creating appropriate props and using correct scientific language*	*Are the lengths of shadows different in summer and in winter?*
What do forces actually do?	*How can a force act on an object?* *How can we see forces?* *How can we measure forces?* *How does the length of a paper helicopter's blades affect the time it takes to fall?* *How does the changing the shape of a piece of plasticine affect water resistance?* *How does adding holes to a parachute affect the time it takes to fall?* *How does the amount/depth of tread affect the friction between a shoe and a surface?* *How can we use levers to lift heavy objects?* *How do see-saws work?*	*Measuring how long it takes paper helicopter to fall when blade length is changed* *Measure angle where shoe starts to move on slopes using different treads* *How does the changing the shape of a piece of plasticine affect water resistance?*	*How does the surface area of a parachute affect how long it takes to fall?* *How does the surface area of an object affect the time it takes to sink?*	*Record data using appropriate tables and graphs* *Correctly label diagrams to explain all the forces acting on objects in different situations*	*Talk about how understanding of forces has affected how things are designed (e.g. cars, boats, planes)*	*Written conclusions of experiments and evaluate limitations in the classroom/things that did not work* *Create a diagram for a working contraption that demonstrates knowledge of different forces*	*Will a parachute made of a different material fall slower than one made of paper?*

Year 5

Working Scientifically

What does the Earth look like from the Solar System?	How can science help?	What does the Earth look like from the Solar System?	What do forces actually do?
Investigate human impact on the planet – what are the worst pollutants, how are different animals impacted at different points in their life cycles? Observe beans carefully during germination and measure and record changes Close observations of plants – is there a correlation between stamens and petals?	Investigate how the temperature of tea affects how long it takes a set amount of sugar to dissolve Experiment to see if different types of sugar dissolve at different rates Experiment to see which materials dissolve in water and which do not Investigate different ways of separating materials (e.g. sieving, filtering) Investigate whether or not changes can be reversed (melting/freezing, dissolving etc)	Measure the length and position of shadows as the sun moves across the sky at different points in the day Research changing daylength throughout the year and how this changes depending on location Identify the phases of the moon Investigate the movement of the planets – is there a pattern between the size of a planet and the time it takes to orbit the sun? Explore how our ideas bout space have changed over time	Experient with paper helicopter – will changing the wings affect how long it takes to fall? Investigate the size/material parachutes are made from and how this affects the time taken to fall Change the shape of a ball of plasticine, how does this affect it floating/sinking? Measure the angle at which a shoe moves on a slope and compare with the depth of tread

Progression in recording science

Oral reports on findings (photographs and comments/post-it notes)
Evidence of experiments as part of a class and in a small group
Evidence in the form of:
- Photographs
- Drawings
- Labelled tables
- Labelled bar charts
- Labelled diagrams
- Written investigations

Written scientific reports with:
- A prediction
- Independent variable and dependent variable identified
- Method
- Results
- A conclusion
- An evaluation of the experiment
- Comments on the experiments of others

Science program for Year 6

There are five main themes in each year group in Key stage 2 science. The following table sets out the Year 6 units.

Main Theme	National Curriculum Requirement	Curious City Enquiry
Biology: Animals, including humans	• Identify and name the main parts of the human circulatory system, and describe (**and** explain) the functions of the heart, blood vessels and blood • Compare resting heart rate of different people • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function **(recommending what constitutes a healthy lifestyle)** **Reseacrh** how drugs affect the body. • Describe **(in depth)** the ways in which nutrients and water are transported within animals including humans • Trip to lifeskills / first aid CPR / Bristol University	How are lives saved?
Biology: Living things and their habitats	• Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms (research viruses, bacteria, moulds, yeast, dust, mites and phytoplankton) plants and animals. **(justifying their choices)** **Research** Carl Linnaeus • Give**(justified)** reasons for classifying plants and animals based on specific characteristics	Linnaeus and Darwin – How are they connected?
Biology: Evolution and inheritance	• Recognise **(and discuss)** that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Compare skulls / body parts of animals as they have evolved. • Recognise (**and** explain) that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Research Charles Darwin • Identify (**and** evaluate **and** explain) how animals and plants (polar bear, camel, cactus, Darwin's finches) are adapted to suit their environment in different ways and that adaptation may lead to evolution (e.g. giraffe)	
Physics: Electricity	• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in a circuit **(correctly predicting and explaining outcomes of planned circuits)** • Compare and give **(justified)** reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches **(and identify real life uses)** • Use recognized symbols when representing a simple circuit in a **(detailed)** diagram	How big is your footprint?
Physics: Light	• Recognise **(and justify why)** light appears to travel in straight lines. Investigate angle of direction of reflected light • Use the idea that light travels in straight lines to explain **(with scientific vocabulary and diagrams)** that objects are seen because they give out or reflect light into the eye	How does light help us see?

Year 6– Working Scientifically - Disciplinary Knowledge

	Planning different types of scientific enquiries to answer questions, including recognizing and controlling variables where necessary	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat reading when appropriate	Planning different types of scientific enquiries to answer questions, including recognising and controlling variable where necessary	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	Identifying scientific evidence that has been used to support or refute ideas or arguments	Reporting on findings from enquiries including oral and written explanations, displays or presentations of results and conclusions	Using test results to make predictions to set up further comparative and fair tests
How are lives saved?	*Why do we need oxygen? How do we breathe?* *How does the size of a person's lungs affect their lung capacity?* *Are there ways to increase/decrease our lung capacity? Is lung capacity fixed?* *Why do we have blood?* *How does our heart work?* *How does exercise affect our pulse rate?* *How might the circulatory system of a hummingbird, elephant and polar bear differ?* *Is the air you breathe out the same as the air you breathe in?*	*How does the length of time we exercise for affect our heart-rate?* *Which type of exercise has the greatest effect on our heart-rate?* *Can exercising regularly affect our heart-rate?*	*How does the length of time we exercise for affect our heart-rate?* *Which type of exercise has the greatest effect on our heart-rate?* *Can exercising regularly affect our heart-rate?* *How does my heart-rate change over the day?* *Is there a pattern between what we eat for breakfast and how fast we can run?*	*Which organs of the body make up the circulatory system and where are they found?* *How does the length of time we exercise for affect our heart-rate?* *Which type of exercise has the greatest effect on our heart-rate?* *Can exercising regularly affect our heart-rate?* *How does my heart-rate change over the day?* *How much exercise do I do in a week*	*Which exercises have the most impact on heart-rate?* *How much exercise should we do a week to keep our hearts and lungs healthy?* *How have our ideas about disease and medicine changed over time?*	*Evaluate experiments – what can we not control?* *Are we always putting the same amount of effort into our exercise?* *Create presentation/video/poster for younger children*	*How does the length of time we exercise for affect our heart-rate? Would it change once we began to get tired?* *Would someone who has eaten a big breakfast be able to run faster than someone who hasn't?*
Linnaeus and Darwin how are they connected?	*Why are we all different?* *What is variation, and why is it important?* *How did life on Earth begin?* *Why do we need to classify things?* *What are the difficulties with classification? (Whales, Penguins, Platypus)* *How do we change?* *What is evolution?* *What evidence is there for evolution?* *What causes living things to go extinct?* *Polar Bears' habitat is rapidly changing, what possible futures do they face, and can we predict which is most likely?* *How did Darwin come up with his theory of Evolution?* *Why was Darwin's theory not initially accepted?* *What do animals and plants compete for any why?* *What are micro-organisms* *How do we change as we get older? (PSHE)* *Do all animal embryos look the same?* *How do humans change?* *Why do humans change?* *What causes puberty?* *What changes do we go through during puberty?* *Are there any patterns between vertebrate animals and their gestation periods?*	*What is the most common eye colour in our class?* *Do we have the same eye colour as our parents?* *How can we sort the children in our class into groups?* *How am I similar to my parents?* *How can we sort and classify a selection of leaves?* *How do we change as we get older? (PSHE)* *How does age affect a human's reaction time?* *How do different animals embryos change over time?*	*Is there a pattern between the size and shape of a bird's beak and the food it will eat?* *What is the most common eye colour in our class?* *Do we have the same eye colour as our parents?* *How can we sort the children in our class into groups?* *How am I similar to my parents?* *How do we change as we get older? (PSHE)* *How does age affect a human's reaction time?* *Who grows the fastest – males or females?*	*Is there a pattern between the size and shape of a bird's beak and the food it will eat?* *What is the most common eye colour in our class?* *Do we have the same eye colour as our parents?* *How has the skeleton of the horse changed over time?* *What happened when Charles Darwin visited the Galapagos Islands?* *How can we sort the children in our class into groups? (e.g. which children can/cannot roll their tongue)* *How am I similar to my parents?* *Create classification key for plants/insects based on visual similarities* *How do we change as we get older? (PSHE)* *Identifying all the different stage of a human life cycle* *Is there a relationship between a mammal's size and its gestation period – scatter graph* *How does age affect a human's reaction time?* *Who grows the fastest – males or females?*	*Compare the skeletons of apes, humans, and Neanderthals – how are they similar, and how are they different?* *Can you classify these observations into evidence for the idea of evolution, and evidence against?* *In what ways can we sort living things?* *How do we change as we get older? (PSHE)* *Is there a relationship between a mammal's size and its gestation period?* *Do all animal embryos look the same?* *Why do people get grey/white hair as they get older?*	*Report on Darwin/Linnaeus and their findings* *Create an animal adapted to a particular habitat and create a fact-file about it* *Report findings about similarities and differences between parents and offspring* *How do we change as we get older? (PSHE)* *Is there a relationship between a mammal's size and its gestation period – explain results* *How does age affect a human's reaction time?* *Evaluate method* *Who grows the fastest – males or females? – Is our data reliable?*	*What will happen to animals in the future with climate change?* *What will happen to a piece of bread if it is left on a windowsill for two weeks in a sealed bag?* *How do we change as we get older? (PSHE)* *Are we better at remembering things when we are older or younger?*
How big is your footprint?	*Do all batteries 'push' as hard as each other?* *How does the voltage of a battery affect how much current is pushed?* *How does the length of time I leave the current flowing for affect the brightness of the bulb?* *How does number of bulbs affect the brightness of a bulb?* *Are all types of wires as good as conducting electricity?* *Why are wires insulated in plastic? Does type of material make a difference?* *Does length of wire make a difference?* *Does the type of circuit affect how the components work/long the battery lasts?* *How does current affect heat?*	*Does the temperature of a light-bulb go up the longer it is on for?*	*How does the voltage of the batteries in a circuit affect the brightness of the lamp?* *How does the voltage of the batteries in a circuit affect the volume of the buzzer?* *Does the temperature of a light-bulb go up the longer it is on for?* *How does the brightness of a bulb change as the battery runs out?*	*Graph to show temperature over time of light-bulb being on* *Correct electrical symbols used in circuit diagrams*	*How has our understanding of electricity changed over time?*	*Children explain what happens to circuits when certain elements are changed* *Evaluate testing methods of equipment*	*Children are able to explain what will happen in circuits when shown different diagrams*
How does light help us see?	*How does the size of an object affect the size of its shadow?* *How does the distance between a light and an object change the size of its shadow?* *How does light travel?* *What happens to light when it travels through water?* *How does a periscope work?* *Why do some people need to wear glasses to see clearly?*	*How does the size of an object affect the size of its shadow?* *How does the distance between a light and an object change the size of its shadow* *How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface?* *What happens to light when it is shone through water? How is this affected by putting glitter, salt or talc in the water?*	*How does the size of an object affect the size of its shadow?* *How does the distance between a light and an object change the size of its shadow* *How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface?* *Can you identify all the colours of light that make white light when mixed together? What colours do you get if you mix different colours of light together?* *How do our eyes adapt to different conditions?*	*Recording size of shadows as objects are changed – creating graphs to represent change* *Recoding angle of light that is reflected off a mirror and comparing it with the angle of light entering the mirror*	*Understanding how knowledge of solar/lunar eclipses has changed over time* *Using own evidence from research to explain how glasses help people to see*	*Draw relationship between angle light hits mirror and angle it is reflected back at* *Identify what happens when shape of lenses changes and how this relates to the eye*	*How could we see around corners? What could we use to help us?*

Year 6

Working Scientifically

How are lives saved?	Linnaeus and Darwin how are thy connected?	How big is your footprint?	How does light help us see?
Investigate if taller children have a greater lung capacity Measure the affect of exercise on heart rate – how does length of time impact heart-rate/which exercise has the greatest effect? Measure how heart rate changes throughout the day	Investigating patterns between vertebrates and their life-cycles (e.g. size, habitat) Investigate patterns in gestation time and size (scatter graphs) What is the most common eye-colour in the class? Are our eye colours the same as our parents? Sorting and classifying leaves Can we sort the children in our class into groups based on characteristics such as tongue-rolling? How do human embryos change over time? How does age affect reaction times/memory recall? Investigate the size of an object and how this impacts the size of a shadow. How does the distance between an object and a light impact its shadow? What happens to light when it travels through water? – does this change when we add things into the water (glitter, flour etc.) How do our eyes adapt to different conditions? Investigate how light changes when it travels through different lenses – use knowledge to understand how glasses help peoplesee How does the angle of light hitting a mirror affect the angle it is reflected at?	Are all types of wires as good at conducting electricity? – different materials Does the length of wire make a difference in a circuit? Does the type of circuit affect how long a battery lasts? How does the temperature of a bulb change when it is left on? Does the voltage of batteries in a circuit affect the brightness of a bulb/volume of a buzzer? How does the brightness of a bulb change at the battery runs out?	Investigate the size of an object and how this impacts the size of a shadow. How does the distance between an object and a light impact its shadow? What happens to light when it travels through water? – does this change when we add things into the water (glitter, flour etc.) How do our eyes adapt to different conditions? Investigate how light changes when it travels through different lenses – use knowledge to understand how glasses help peoplesee How does the angle of light hitting a mirror affect the angle it is reflected at?

Progression in recording science

Evidence of planning different kinds of fair experiments
Oral reports on findings (photographs and comments/post-it notes)
Evidence of experiments as part of a class and in a small group
Explanations as to why controlling variables are important
Evidence in the form of:

- Photographs
- Drawings
- Labelled tables
- Labelled bar charts
- Labelled diagrams
- Written investigations
- Line graphs

Written scientific reports with:

- A prediction
- Independent variable and dependent variable identified
- Method
- Results
- Repeated measurements
- A conclusion
- An evaluation of the experiment
- Comments on the experiments of others

Identify scientific evidence that has been used to support ideas