YEAR 4	
Working scientifically **During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:**	**Vocabulary** **Focus 3/5 to be introduced 2023**
• asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • 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, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.	research- relevant questions scientific enquiry comparative and fair test systematic careful observation accurate measurements equipment – thermometer, data logger data- gather, record, classify, present record- drawings, labelled diagrams, keys, bar charts, tables oral and written explanations conclusion predictions differences, similarities, change evidence improve secondary sources guides, keys construct interpret

Programme of study, skills and vocabulary

	Autumn 1		Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
A	**From Sept 23** Revisit and practice key vocab 'Focus 3/5' and concepts from previous year's learning	States of matter	Electricity	Sound	Revisit previous content	Living things and their habitats	Animals including humans
B		Rocks	Light	Forces	Revisit previous content	Plants	Animals including humans

Stories

Teaching science through stories | STEM

story-links-list.pdf

Book Lists for Primary Science Topics (booksfortopics.com)

Horrid Henry Rocks *(Francesca Simon)* ***Moonbird***	***Charlie and the Chocolate Factory*** *(Roald Dahl)* ***Once Upon a Raindrop: The Story of Water***

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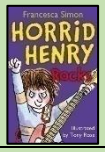
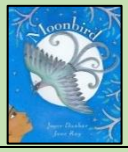
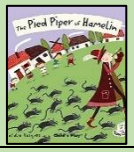
(Joyce Dunbar)

The Pied Piper of Hamelin
(Natalia Vasquez)

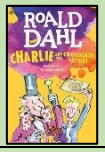


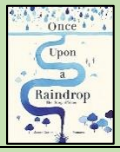




(James Carter)

Sticks
(Diane Alber)

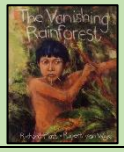


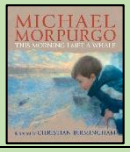


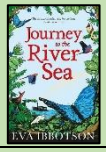
The Vanishing Rainforest
(Richard Platt)

The Morning I Met a Whale
(Michael Morpurgo)

Journey to the River Sea
(Eva Ibbotson)



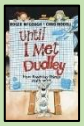


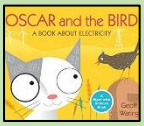


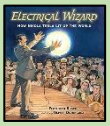
Until I Met Dudley
(Roger McGough)

Oscar and the Bird: A Book about Electricity
(Geoff Waring)

Electrical Wizard: How Nikola Tesla Lit Up the World
(Elizabeth Rusch)



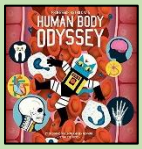


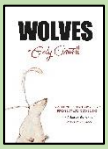


Human Body Odyssey
(Werner Holzwarth)

Crocodiles Don't Brush Their Teeth
(Colin Fancy)

Wolves
(Emily Gravett)





Also look at Yr 3 selection

Job titles

stem-careers-by-topic-1.pdf (wordpress.com)

States of matter

Key objectives	Specific skills	Vocabulary
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.	Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting	Solid liquid gas air oxygen powder grain/ granular crystals ice/ water/ steam water vapour heated/ heating cooled/ cooling temperature degrees Celsius melt freeze solidify melting point molten boil

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	Big question tbc	**Famous names/inventions** Joseph Priestly – Discovered oxygen Lord Kelvin -Absolute zero (temperature) Anders Celsius -Temperature Scale Daniel Fahrenheit-Temperature Scale / Invention of the Thermometer George Washington Carver- chemist	
Electricity	**Key objectives** Identify common appliances that run on electricity Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers 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 Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit Recognise some common conductors and insulators, and associate metals with being good conductors.	**Specific skills** Pupils might work scientifically by: observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.	**Vocabulary** **appliances electricity electrical circuit cell wire bulb buzzer danger electrical safety sign insulators wood rubber plastic glass conductors metal water switch open closed components plug motor mains**
	Big question tbc	**Famous names/inventions** Michael Faraday- Discovered relationship between magnets and electricity Thomas Edison- Lightbulb Joseph Swan- Incandescent Light Bulb	

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Sound	**Key objectives** Identify how sounds are made, associating some of them with something vibrating Recognise that vibrations from sounds travel through a medium to the ear Find patterns between the pitch of a sound and features of the object that produced it Find patterns between the volume of a sound and the strength of the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound source increases	**Specific skills** **Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.**	**Vocabulary** **sound source noise vibrate travel solid liquid gas pitch tune high low volume loud quiet fainter muffle vibrations insulation instrument percussion strings brass woodwind tuned instrument**
	Big question tbc	**Famous names/inventions** Alexander Graham Bell - Invented the telephone Aristotle - Sound Waves Gailileo Galilei - Frequency and Pitch of Sound Waves	
Living things and their habitats	**Key objectives** Recognise that living things can be grouped in a variety of ways Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment Recognise that environments can change and that this can sometimes pose dangers to living things.	**Specific skills** **Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.**	**Vocabulary** **environment flowering non-flowering plants animals vertebrate danger invertebrates- snails, slugs, worms, spiders, insects vertebrates- fish, amphibians, reptiles, birds, mammals plants – flowering plants, nonflowering plants population development litter deforestation**
	Big question tbc	**Famous names/inventions** Jacques Cousteau -Marine Biology Cindy Looy-Environmental Change and Extinction Joean Beauchamp Procter Zoologist	

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Animals including humans	**Key objectives** Describe the simple functions of the basic parts of the digestive system in humans Identify the different types of teeth in humans and their simple functions Construct and interpret a variety of food chains, identifying producers, predators and prey. Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat Identify that humans and some other animals have skeletons and muscles for support, protection and movement.	**Specific skills** **Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy and design meals based on what they find out** **Pupils might work scientifically by: comparing the teeth of carnivores and herbivores, and suggesting reasons for differences; finding out what damages teeth and how to look after them. They might draw and discuss their ideas about the digestive system and compare them with models or images.**	**Vocabulary** **nutrition vitamins minerals fat protein carbohydrates fibre water skeletons – support, protection skulls – brain ribs – heart, lungs joint muscles- movement, pull, contract relax diet** **human digestive system mouth tongue-mixes, moistens, saliva teeth: incisors- cutting, slicing canines- ripping, tearing molars-chewing, grinding oesophagus transports stomach acid enzymes small intestine large intestine carnivore herbivore omnivore brush floss food chain Sun producers prey predator**
	Big question tbc how am I made?	**Famous names/inventions** Marie Curie- Radiation Wilhelm Rontgen - X rays Adelle Davis -Nutritionist Joseph Lister-Antiseptic Ivan Pavlov- Digestive System Mechanisms Washington & Lucius Sheffield- Toothpaste in a tube	
Rocks	Key objectives 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 Recognise that soils are made from rocks and organic matter	**Specific skills** **Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed**	**Vocabulary** **rock stone pebble boulder soil fossil grains crystals hard/ soft texture absorb water marble chalk granite sandstone slate sandy soil clay soil chalky soil peat**

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	Big question tbc what is beneath my feet?	**Famous names/inventions** Mary Anning- Fossil hunter Dr Anjana Khatwa Geologist Ursula Marvin- Geologist William Smith Fossils strata Inge Lehrmasn -Earth's Mantle Katia Krafft - Geologist and Volcanologist	
Light	**Key objectives** 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 a solid object Find patterns in the way that the size of shadows change.	**Specific skills** **Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.**	**Vocabulary** **light see dark reflect reflective surface natural star Sun Moon artificial torch candle lamp translucent transparent**
	Big question tbc why can't I see in the dark?	**Famous names/inventions** Justus Von Liebig Mirrors James Clerk Maxwell (Visible and Invisible Waves of Light)	
Forces and magnets	**Key objectives** Compare how things move on different surfaces Notice that some forces need contact between 2 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 Describe magnets as having 2 poles Predict whether 2 magnets will attract or repel each other, depending on which poles are facing.	**Specific skills** **Pupils might work scientifically by: comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces and gathering and recording data to find answers their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets.**	**Vocabulary** **Force push pull open surface magnet magnetic attract repel magnetic poles north south metal iron steel**

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	Big question tbc why do some objects stick to my fridge but others don't?	**Famous names/inventions** Andre Marie Ampere- Electro-magnetism The Wright Brothers Airplanes Henry Ford- Cars	
Plants	**Key objectives** Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers 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 investigate the way in which water is transported within plants explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	**Specific skills** **Pupils might work scientifically by: comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed. They might observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers**	**Vocabulary** **structure – flowering plants, roots, stem/ trunk, leaves, flowers function – nutrition, support, reproduction, makes own food requirements for life and growth – air, light, water, nutrients from the soil, room to grow, fertiliser life cycle - flowers pollination, seed formation, seed dispersal**
	Big question tbc	**Famous names/inventions** Joseph Banks- Botanist Ahmed Mumin Warfa - Botanist Marianne North- Botanist	