



Science overview

Key concepts

Planning and predicting



Investigating and observing



Recording, analysing and evaluating



EYFS	Autumn		Spring		Summer	
Understanding the world	Autumn- exploring seasonal changes	Autumn-exploring seasonal changes	Winter-exploring seasonal changes	Spring- Observing plants and animals beginning to grow	Summer- exploring seasonal changes	Summer- exploring seasonal changes
The natural world	Materials, waterproof, magnets.	Senses-nature walks and sorting	Senses-nature walks, tasting foods, listening games, feelie bags, smelling essential oils,	Senses-nature walks	Senses-nature walks	Senses-nature walks
Science		Arctic-terrain, animals-compared our local environment	Weather, change in temperature-snow and ice	Understanding what makes plants/seeds grow	Life Cycles-Caterpillars to Butterflies and Tadpoles-Frogs	Sea creatures, creating habitats such as rock pools. Vehicles and ramps
			Change of state <i>Great Big Bird Watch-26th January</i>	Planting, growing and caring for seeds and flowers		



Year 1	Autumn		Spring	Summer		
Key skills & ideas (disciplinary knowledge)	<p>Planning and Predicting Ask questions about the World around them that can be answered in different ways. Suggest what might happen and how to test ideas</p> <p>Investigating and Observing Make observations using appropriate senses. Observe closely using simple equipment (e.g. hand lenses, egg timers). Use non-standard measures. Make simple comparisons and groupings. Perform simple test to investigate the answer to a given question.</p> <p>Recording, analysing and evaluating Communicate findings in simple ways- pictorial and 1 or two sentences. Make oral contributions which can add to group or class discussion. Collect evidence to try to answer a question. Gather and record data/ observations using given tables or sorting charts.</p> <p>Continuity and Change: Observe what changes and what stays the same. Observe what changes and what stays the same with flowering plants. Observe seasonal changes and what stays the same</p> <p>Similarity and Difference: Make comparisons and note differences.</p> <p>Cause and Consequence: With support, find patterns and draw simple conclusions</p> <p>Written and Oral Expression: Describe what they observe in science orally and in simple sentences. Use scientific vocabulary appropriate to year group</p> <p>Responsibility: Follow basic rules to keep safe whilst working</p>					
Key concept vocabulary	change, describe, properties		Key topic vocabulary	roots, stem, leaves, materials, seasons, weather, carnivore, herbivore, force, push, pull, names of body parts, human senses,		
Focus / Enquiry question	Is a tree a plant? What are plants like in Autumn?	What is our school made of? How can we sort these materials?	Is a human an animal? What kind of animal is a human?	What changes can we see in Spring? How do we make things move?	What are my 5 senses? How far can my eyes see?	What are plants like in summer? What will happen to my seed?
Learning objectives (substantive knowledge)	<ul style="list-style-type: none"> Identify plants and not plants in school grounds. Note key features of all plants identified. Compare plants with trees using these features and then use their observations and findings to answer the Key Question: Is a tree a plant? (observe closely, compare and contrast, describe groupings, explore and answer questions) Name the four seasons. Zoom in to autumn; zoom in to one evergreen tree and one deciduous tree in the school grounds. Label a diagram of a tree: leaves, trunk, branches. Key Question: What are plants like in autumn? (observe closely, compare and contrast, labelled diagrams) Start a whole class working display – record today's date, weather, 	<ul style="list-style-type: none"> Link forward - Y2 - Everyday Materials. Go into school grounds identify, name and label parts of the external school building, Key Question: What is our school made of? (observe, name) Group everyday objects made from wood, metal, plastic. Record using table/photos – sort photos against correct material (identifying, grouping, classifying) Recap meaning of 'material'. Classify materials based on their properties: wood, metal, plastic, fabric, glass, rock. Key Question: How can we sort these materials? (binary answers: e.g. hard/soft, rough/smooth, bendy/not bendy). Record using stem sentences and properties of materials: e.g. Wood is and 	<ul style="list-style-type: none"> Research using secondary sources (video clips, pictures, teacher knowledge) Use photos to identify animals and not animals - provide selection of photos including birds, fish, amphibians, reptiles and mammals (including human), with some examples of familiar pets and farm animals, as well as examples of plants, rocks and elements (water, fire etc.). Children to explain how they know if the photo shows an animal and use this to answer the Key Question: Is a human an animal? (use observations to explore and answer questions) Zoom in to animals: identify and sort pictures into groups using key features: fish, birds, mammals, including a human. How do you know 	<ul style="list-style-type: none"> Link to prior learning from autumn term + link forward to summer term. Key question: What changes can we see in Spring? Ongoing throughout the term - Continue with whole class working display, once a week recording date, weather, temperature and the time it goes dark. Note clocks moving forward at the end of March and days getting longer. Record today's data in books (observe and talk about changes, make tables/ charts/displays) Recap the four seasons. Forces - Key Question: How do we make things move? Identify pushes and pulls in play – i.e. with toys and playground equipment. Can we make pushes and pull with our bodies – link to PE 	<ul style="list-style-type: none"> Link to work in spring term (humans as animals/mammals/ omnivores). Recap what they know about humans. Name and label external parts of their body: neck, shoulders, chest elbow, hands, fingers knees, feet, toes Compare body parts of a human with those of a cat using double bubble graphic organiser. What is the same? What is different? (observe closely, compare and contrast, explore and answer questions) Key question: What are my 5 senses? Identify and name the five senses. Zoom in on sound, smell, and taste – children to experience selection of each. Record by showing preferences (draw or write). (compare and contrast) 	<ul style="list-style-type: none"> Link to prior learning from autumn term and spring term. * Ongoing throughout the term - Continue with whole class working display, once a week recording date, weather, temperature and the time it goes dark. Note longest day on June 21st. Record today's data in books. (observe and talk about changes, make tables/charts/displays) Recap the four seasons and complete the whole class working display. Zoom in to summer. Identify and name flowering plants in the school grounds. Key Question: What are plants like in summer? (observe closely, compare and contrast, draw diagrams) Zoom in to look at plant structure. Label:

	<p>temperature and the time it goes dark. Continue throughout year, adding to it every month. Note clocks moving back in October and nights drawing in. Record today's data in books (observe and talk about changes, make tables/ charts/displays</p>	<p>(identifying, grouping, classifying)</p> <ul style="list-style-type: none"> Investigation: (comparative test) – Planning: Which is the best material for an umbrella? Which material makes the best moppper upper? (comparative test) – results (what happened) – Conclusion, answering the question – how do you know?) (raise and answer questions, perform simple tests to explore and answer questions) 	<p>this is a fish? How do you know this is a bird? etc. Use process of elimination to answer the Key Question: What kind of animal is a human? (identifying, grouping, classifying, use observations to compare and contrast, explore and answer questions)</p> <ul style="list-style-type: none"> Zoom in to animals: identify and sort pictures of amphibians and reptiles using key features as before – frog, toad, newt, snake, lizard, turtle, and crocodile. (identifying, grouping, classifying, use observations to compare and contrast) Animals need food to survive – they either eat plants, or animals, or both. Classify and sort animals into herbivore, carnivore, and omnivore. Key Question: Humans - herbivore, carnivore or omnivore? (identifying, grouping, classifying 	<ul style="list-style-type: none"> Sort forces according to whether it is a push or a pull. (identifying and classifying) -using sorting hoops go on a force hunt around school/ classroom label pushes and pulls. Comparative test: How can I make my car move faster/ further? Sound - Go on a listening walk around school what sounds can you hear. "Sound Quiz" can we identify what has made the sound. Investigate different ways to make sounds and change the volume of the sound? 	<ul style="list-style-type: none"> Recap on five senses. Zoom in on touch and sight. - Use feely bags to explore textures. – Complete sight investigation: (pattern seeking) - How far can my eyes see? Use similar pics/measure distances. Share data to draw an overall class conclusion on sight/distance. –Further discussion – Which do you think is the most important sense? Why? (compare and contrast, use observations to ask and answer questions) 	<p>flowers/blossom, petals, stem, leaves, roots, fruit (identify, labelled diagrams)</p> <ul style="list-style-type: none"> Plant a sunflower seed. Key Question: What will happen to the seed? (explore and answer simple questions) Return to the two trees and record changes. (observe closely, compare and contrast, keep records of changes over time) Link forward – Y2 - What plants need to grow. Observe and record changes to sunflower seed. Key Question: What has happened to the seed? (use observations to answer questions)
National curriculum	<p>Seasonal changes - Observe changes across the seasons, including weather and variation in day length Plants - Identify and name common wild and garden plants, including deciduous and evergreen trees; describe the basic structure of trees</p>	<p>Everyday materials - Distinguish between an object and its material; identify and name everyday materials; describe simple properties of materials and group objects according to these.</p>	<p>Animals, including humans - Identify and name a variety of common animals and their structures: fish, amphibians, reptiles, birds and mammals, including pets; identify and name carnivores, herbivores and omnivores</p>	<p>Seasonal changes - Observe changes across the seasons, including weather and variation in day length Plants - Identify and name common wild and garden plants, including deciduous and evergreen trees (as part of seasonal walk) *Forces - Notice and describe how things move. Noticing fast and slower. *Sounds - Observe and name a variety of sources of sounds.</p>	<p>Animals, including humans - Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</p>	<p>Seasonal changes - Observe changes across the seasons, including weather and variation in day length Plants - Identify and name common wild and garden plants, including deciduous and evergreen trees; describe the basic structure of a variety of common flowering plants.</p>

Year 2	Autumn		Spring	Summer		
Key skills & ideas (disciplinary knowledge)	<p>Planning and Predicting With help, raise some ideas and questions to investigate. Raise questions based on what they have observed. Think about how to collect evidence. Suggest what might happen. Think about and discuss whether comparison is fair or unfair.</p> <p>Investigating and Observing Make observations and comparisons using simple equipment following simple instructions. Use first-hand experience and, with help, simple information sources to answer questions. Research the answers to questions using books, computers or tablets. Use rulers/tape measures to take measurements in cm.</p> <p>Recording, analysing and evaluating Record findings in simple tables, tally charts and graphs (as covered in year 2 maths curriculum). Say what has happened and whether if it was what you expected. Use observation and ideas to answer questions using simple sentences to describe the answer. Draw basic conclusions with simple reasoning. Record findings using labelled diagrams.</p> <p>Continuity and Change: Observe what changes and what stays the same Similarity and Difference: Make comparisons, note differences and draw conclusions Significance: Identify significant information and explanations about plants Written and Oral Expression: Draw conclusions and explain processes. present data in simple tables, tally charts and block graphs /pictograms Responsibility: Understand how to work safely and fairly</p>					
Key concept vocabulary	predict, material, movement, sort		Key topic vocabulary	habitat, food chain, germination, pollination, growth, health, nutrition, deciduous, evergreen, names of common materials		
Focus / Enquiry question	Which do you think is the best material for a (plate/cup/spoon)? How can we change the shape of different materials?	Do all baby animals look like their parent?	What do plants need to grow and stay healthy?	What do plants need to grow and stay healthy?	How do we know it is alive?	What microhabitats are there in the school environment?
Learning objectives (substantive knowledge)	<ul style="list-style-type: none"> Link to prior learning – Everyday Materials Y1 - Recap materials and the difference between a material and an object. Examine each material and recap properties and vocabulary Investigation: (pattern seeking) What can you find in our classroom made of wood/metal/plastic? Find examples and collate data using a simple table/tally chart. Use this evidence to make a hypothesis as to which of these three materials is the most common in the classroom. (ask and answer questions) Selection of same object (e.g. plates or cups or spoons) made from different materials (e.g. paper, plastic, and ceramic). Identify and 	<ul style="list-style-type: none"> Link to prior learning: Y1 animal classification, including humans. Picture sort – match adult to young: human/baby, frog/tadpole, cat/kitten, butterfly/caterpillar, crocodile/hatchling, shark/pup, and swan/cygnets. Key Question: Do all baby animals look like their parent? (observe, ask and answer questions) Focus on life cycle of a chicken. Key Question: Is it only birds that lay eggs? Children to further explore ONE of the following life cycles: a moth, a frog or a human Recap on what habitats provide for living things and secure understanding of the four basic needs for survival: food, water, air, shelter. Children discuss and record how one 	<ul style="list-style-type: none"> Link to prior learning: Y1 summer term - Recap on parts of a plant. Key Question for this term's work: What do plants need to grow and stay healthy? Take ideas/predictions/ suggestions from children. Recap on planting sunflowers at end of Y1. Show bean seed investigation: (fair test) – Planning - Does a plant need water to grow? Investigation: (fair test) – Results (what happened) and Conclusion (answering the question – how do you know?) Development question: What will happen if I keep watering the one that has germinated? (raise and answer questions, perform simple tests to explore and answer questions) 	<ul style="list-style-type: none"> Link to prior learning before Christmas. Initial results of observation over time – evidence of germination but slower in colder temps (perform simple tests to explore and answer questions) Investigation: (fair test) – Planning Does a plant need light to germinate? Cress seeds to be planted and left in the light and in the dark. Results (what happened) Conclusion (answering the question – how do you know?) Evidence of growth in both light and dark, but plants in the dark are paler and less healthy (sunlight provides food/energy for leafy plants, therefore healthier in the light) (raise and answer questions, perform simple tests to explore and answer questions) 	<ul style="list-style-type: none"> Link to prior learning: plants, seasonal changes In playground, identify things that are living/not living. Through further discussion, sort pictures of objects that are living, used to be alive, and have never been alive, e.g. wooden bench, cooked chicken (classifying and sorting, raising and answering questions, record using charts) Link back to last lesson and things that are living. Zoom in on living things – animals and plants. Key Question: How do we know it is alive? Discuss using what they know about conditions for growth/health of plants and what they know about themselves as animals plus pets/knowledge of other living things. Begin 	<ul style="list-style-type: none"> Link to prior learning from previous term + link forward to Y4 Habitats Key Question: What microhabitats are there in the school environment? Recap 'habitat' and what living things need to survive. Zoom in on the local habitat of the playground and link back to Y1 work by exploring the school forest and identifying microhabitats within it (e.g. a decomposing log, or one particular tree). Identify and name animals found in any of the school microhabitats and record these (drawing/photos) Back in class, classify any animals found, introducing the term 'invertebrate'. (observe, identify, classify) Recap on habitat of our school forest and make

	<p>name the properties of each material</p> <ul style="list-style-type: none"> Investigation - Which do you think is the best material for a (plate/cup/spoon)? Why? Record using photos/giving reasons. Carry out a series comparative tests related to properties - (observe, compare, record observations) Provide children with a range of objects of different materials, including examples of thick and thin, for example thick cardboard box/piece of paper; felt tip pen /freezer bag; pan/piece of foil. Also provide everyday inflexible objects made of wood/stone. In groups, children explore how to change the shape of each object/material. Discuss those that they cannot change with their hands – what could be used instead? Discuss how changing the shape of a material offers a wider range of uses. (observe, compare, ask questions, use observations to answer questions) 	<p>example of a mammal, one fish, one bird each get their basic needs met in their relevant habitat.</p> <ul style="list-style-type: none"> Zoom into humans. Key Question: What do humans need to stay healthy? Lesson on food groups and balanced diet Zoom into humans. 5-minute workout - identify how it makes them feel. Establish recommended exercise per day. Investigation: (pattern seeking) - Have I had enough exercise today? Support the children to calculate and record their exercise for today. Use this data to draw individual conclusions and answer question. (gather and present data in tables, use data to answer questions) Discuss and record what we need to do to stay clean and healthy (link to PSHE)- 	<ul style="list-style-type: none"> Continue to observe growth/changes – detailed labelled drawing of bean plant: stem, leaf, roots (closely observe, draw labelled diagrams) Link forward - Y3 Labelling parts of flowering plant Investigation: (observations over time) - Does a plant need warmth to germinate? plant two bulbs of flowering plants (one indoors, one outdoors); draw/write a prediction for each bulb (perform simple tests to explore and answer questions) 	<ul style="list-style-type: none"> Final results of observation over time (warmth) – further growth of bulb, evidence of bud/flowers when kept in the warm. Pull together understanding from whole term on conditions for growth from all investigations - overall conclusion for effects of water, light and temperature on growth and health of plants. (raise and answer questions, perform simple tests to explore and answer questions) 	<p>to create a list of factors that determine if something is alive (simplified version of MRSGREN – link forward to Y4) (exploring questions, using observation to answer questions)</p> <ul style="list-style-type: none"> Link forward – Y4 Habitats - Recap on living things that were found in our playground – establish that the different areas in the playground are called habitats. Establish that a habitat provides a living thing with everything it needs to survive. Whole class activity: match selection of animals and plants to 5 global habitats (Atlantic Ocean, Sahara Desert, Colne, Arctic tundra, Buffalo Gap Grassland (USA). Locate these habitats on the world map. (identify, classify, group, describe groupings) 	<p>comparisons with rainforest habitat</p> <ul style="list-style-type: none"> What is the same? What is different? (observe, compare and contrast) Link back to Y1 to recap key vocabulary: herbivore, carnivore, omnivore Use familiar examples, including humans, to build simple food chains (e.g. grass, cow, human or worm, blackbird, cat) referring to herbivores, carnivores and omnivores. Use this activity to secure understanding of how animals obtain their food from plants and other animals, as well as introducing the idea of dependency within habitats for survival
National curriculum	<p>Uses of everyday materials - Identify and compare the suitability of a variety of everyday materials for particular uses; find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</p>	<p>Animals, including humans - Notice that animals, including humans, have offspring which grow into adults; find out about and describe the basic needs of animals, including humans; describe the importance for humans of exercise, eating the right amounts of different foods.</p>	<p>Plants - Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy; observe and describe how seeds and bulbs grow into mature plants.</p>	<p>Plants - Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy; observe and describe how seeds and bulbs grow into mature plants.</p>	<p>Living things and their habitats - Explore and compare the differences between things that are living, no longer alive, and that have never been alive; identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants; identify and name a variety of plants and animals in their habitats</p>	<p>Living things and their habitats Identify and name a variety of plants and animals in their habitats, including micro-habitats; describe how animals obtain their food from plants and other animals using the idea of a simple food chain.</p>

Year 3	Autumn		Spring		Summer	
Key skills & ideas (disciplinary knowledge)	<p>Planning and Predicting Respond to suggestions, with help put forward ideas about testing. Make predictions. With help, consider what constitutes a fair test. With help, plan and carry out a fair test.</p> <p>Investigating and Observing Make observations and comparisons with increased independence. Set up simple practical enquiries, comparative tests and fair tests. Measure length, volume of liquid and time in standard measures using simple equipment. Use first-hand experience and simple information sources to answer questions</p> <p>Recording, analysing and evaluating Communicate findings in a variety of ways. Say whether what happened was expected. With help, identify simple patterns and suggest explanations. Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables. Report on findings both orally to the class and in written explanations of results and conclusions. Use results to draw conclusions.</p> <p>Continuity and Change: Observe over time. Observe what changes and what stays the same. Understand what changes and what stays the same.</p> <p>Similarity and Difference: Make comparisons by describing similarities and differences. Use comparison to describe patterns and draw conclusions.</p> <p>Significance: Learn about significant discoveries, theories and scientists.</p> <p>Cause and Consequence: Observe processes and relate these to simple scientific ideas.</p> <p>Responsibility: Work safely, comparatively and fairly.</p> <p>Written and Oral Expression: Present and interpret data and draw conclusions. Share findings of investigations orally and in written form. Use scientific terminology and explain processes.</p>					
Key concept vocabulary	observe, investigate, sort		Key topic vocabulary	names of food groups, balanced diet, pollination, flowering, non-flowering, transportation, basic names of bones, magnetic, repel and attract, types of rocks, fossil, vibrate, reflect		
Focus / Enquiry question	Can we see in the dark? What are shadows?	On which surface will the car travel furthest? Which materials are magnetic?	Which rock is the hardest? What is soil?		How does water travel around a plant?	Where can we see muscles on our body? What would happen if humans didn't have a skeleton?
Learning objectives (substantive knowledge)	<ul style="list-style-type: none"> • Link to prior learning – Y1 senses – sight. Link forward – Y6 Light • Sorting light sources and not light sources with pictures. Some objects appear to be light sources but instead reflect the light from sources e.g. moon, bike reflectors. (classifying) • Key question: can we see in the dark? Comparative test with object inside box. Torch shone through hole to illuminate object. • Establish that we need light to see, and that darkness is the absence of light. (recording findings using simple scientific language, drawings, labelled diagrams) • Key question: How do we see? Diagram to show light travelling from a light source to our eyes. Learn not to look at the sun directly and how to protect our eyes. (recording 	<ul style="list-style-type: none"> • Scientist: Sir Isaac Newton (1642 – 1727) - PHYSICIST – established the three laws of motion • Find push and pull forces in the classroom and label with post its. Sort objects or actions which use push/pull forces into Venn diagram (gathering, recording, classifying and presenting data in a variety of ways to help in answering questions) • Link forward – Y5 Forces - Key question: On which surface will the car travel furthest? (fair test). Present results in a bar chart. Use the conclusion to introduce the word friction as the force slowing the object down (recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables) • Key question: Does a magnet have to touch the 	<ul style="list-style-type: none"> • Bridge back to Y2 materials and link to geography. Where can we find rock in our school grounds? Tell chn that most rocks are naturally occurring and there are different types of rock which are formed in different ways. • Name rock samples using secondary sources and sort into sedimentary, igneous and metamorphic – draw/label a simple diagram to show the rock cycle. (identifying differences, similarities or changes related to simple scientific ideas and processes) • Name rock samples using secondary sources and sort into categories based on their appearance (gathering, recording, classifying and presenting data in a variety of ways to help in answering questions) • Key question: which rock is the hardest? Devise a simple test to classify rocks by their hardness. Look for patterns when drawing conclusions e.g. metamorphic rocks are harder. (recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables) • Link forward to Y6 – Mary Anning + Evolution • Observe a range of fossils. Research using secondary sources how fossils are formed and establish a link between most fossils and sedimentary rocks (careful observation, use research to ask and answer questions) • Key question: what is soil? Use secondary sources to understand how soil is formed. Observe a range of soils closely and classify them based on their appearance and what each is made from. • Key question: which is the most absorbent soil? Children devise a comparative test to find out how long it takes water to 		<ul style="list-style-type: none"> • Link to prior learning - Y2 parts of plant/conditions for growth • Compare different plants – cactus, fir tree, waterlily, rice plant, and snowdrop. • Key Questions: Which plant needs the most water? Which plant needs the highest temperature? Which plants could survive in the UK? (identify differences/ similarities, explore and answer questions) • Recap names of parts of a flowering plant (Y2 bean plant). • Explore and discuss the idea that every part has a job to do: leaf (food), root (nutrition), stem (support), flower (reproduction). • Revise conditions to grow (air, light, water, warmth) and develop (nutrients room soil, and room to grow). • Record using detailed labelled diagram, including functions. (careful 	<ul style="list-style-type: none"> • Link to prior learning – Y2 - what humans need to be healthy • Recap on living things – sort selection of photos into plants and animals. Revise basic needs for survival of living things; establish that plants produce their own food, whereas animals eat other living things (herbivores, carnivores, omnivores). • Link forward to Y6 circulatory system/keeping healthy • Recap what constitutes a healthy, balanced diet for humans. Zoom in on nutritional values of different supermarket produce using food labels. • Key Questions: Which food do you think contains the most.....? (Fat, sugar, salt, fibre etc.) (use research to ask and answer questions) • Investigation: (pattern seeking) – conduct a survey

	<p>findings using simple scientific language, drawings, labelled diagrams)</p> <ul style="list-style-type: none"> Investigation: (comparative test) - which material reflects light the best? Set up investigation and record results and conclusion. Key question: what are shadows? Investigate shadows using torches and a range of opaque, translucent and transparent objects. Observe differences. Draw a diagram to explain how shadows are formed. (careful observations, pattern seeking) Key question: Do shadows always stay the same size? Investigate how to change a shadow's size by moving the torch towards and away from an object. Stem sentence: The closer to the light source an object is, the bigger the shadow will be. (pattern seeking). 	<p>object to attract it? Investigate magnetism of different objects through a piece of paper/card; through the table; from various distances. Establish magnetism as a non-contact force</p> <ul style="list-style-type: none"> Observe that magnets will attract some objects. Use magnets to find and group materials that are magnetic. Key question: Which materials are magnetic? (gathering, recording, classifying and presenting data in a variety of ways to help in answering questions) Observe that magnets have a north and a south pole. Observe which poles attract and repel. Use a marked magnet to find and mark unmarked poles on another magnet (using straightforward scientific evidence to answer questions or to support their findings). 	<p>drain through soil samples. Children present findings using a bar chart and make conclusions. (recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables)</p>	<p>observations, discuss relationship between structure and function)</p> <ul style="list-style-type: none"> Zoom in on flowers - explore life cycle of flowering plants and the part flowers play - pollination, seed formation seed dispersal. Investigation: (pattern seeking) - How does water travel around a plant? Complete carnation/food colouring investigation (explore questions, observe over time, use observations to answer questions). 	<p>asking staff about their breakfast and lunch. Share and discuss answers - design a daily diet containing a balance of nutrients.</p> <ul style="list-style-type: none"> Group pics of animals - with a skeleton / without a skeleton. Match skeletons to animals. (careful observations; identify differences/ similarities; identify, group and classify) Observe the effect of a skeleton on support (spine), protection (skull) and movement (pelvis). Address misconceptions e.g. slug/snake, exoskeletons etc Key Question: What would happen if humans didn't have a skeleton? (careful observations; explore ideas) Explain the purpose of muscles for movement and maintaining body positions, including the heart (internal). Key Question: Where can we see muscles on our body? (careful observations; identify differences/ similarities)
National curriculum	<p>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; find patterns in the way that the size of shadows change.</p>	<p>Forces and Magnets – Compare how things move on different surfaces; 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; describe magnets as having two poles; predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>	<p>Rocks and Soils - 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.</p>	<p>Flowering plants - Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers; explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal; explore the requirements of plants for life and growth and how they vary from plant to plant; investigate the way in which water is transported within plants.</p>	<p>Animals, including humans - 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.</p>

Year 4	Autumn		Spring		Summer	
Key skills & ideas (disciplinary knowledge)	<p>Planning and Predicting Recognise why it is important to collect data to answer questions. Suggest questions that can be tested. Put forward ideas about testing and make predictions. Begin to design own tests identifying and managing variables. With help, consider what constitutes a fair test.</p> <p>Investigating and Observing Set up simple practical enquiries and begin to make decisions about which equipment is appropriate for investigations. Make relevant observations and comparisons. Make measurements of temperature, time weight, length and volume with increasing accuracy. Using a range of equipment including thermometers, rulers, stopwatches, measuring jugs/ cylinders and data loggers. Begin to think about why measurements may need repeating to check accuracy. With help, carry out a fair test recognising and explaining why it is fair Identify criteria for classification, use and create simple keys.</p> <p>Recording, analysing and evaluating Explain what the evidence shows in a scientific way and whether it supports predictions. Suggest improvement to their work. Record findings using scientific language, drawings, labelled diagrams, keys, bar charts and tables. Comment on findings of other investigations compared to own and how they support or contradict. Draw conclusions with clear evidence, suggest improvements and raise further questions for possible further investigation</p> <p>Similarity and Difference: Make comparisons and note differences. Identify similarities and differences whilst understanding how to be responsible scientist.</p> <p>Responsibility: Understand how to be a responsible scientist, thinking fairly and comparatively. Understand the impact of breaks in food chains and how they can become unsustainable.</p> <p>Continuity and Change: Observe what changes and what stays the same within a habitat. Identify continuity and change whilst understanding how to be responsible scientists.</p> <p>Written and Oral Expression: Present findings orally, in written form and through presentations. Use scientific terminology and explain processes.</p> <p>Significance: Discuss and understand scientific discoveries and theories.</p>					
Key concept vocabulary	compare, classify, characteristic, impact, patterns		Key topic vocabulary	vertebrate, invertebrate, key, solid, liquid, gas, evaporate, condensation, precipitation, circuit, switch conductor, insulator, vibration, pitch, volume, digest, digestive system (names of organs/teeth)		
Focus / Enquiry question	What is a slug? What bird is this?	How can I improve my local environment? Can you pour a solid?	Why does it rain? How can we speed up evaporation?	How can I make a bulb light up? Can I make a bulb light up without wire?	Why some are sounds louder than others? Can sound travel through solid objects?	What animal would have this tooth?
Learning objectives (substantive knowledge)	<ul style="list-style-type: none"> Link to prior learning - Y1 classification; Y2 - identify/ name plants and animals in local environment Recap on vocab from prior learning: Habitat, Vertebrates, Invertebrates Recap on how we know something is alive (Y2) but formalise this using MRSGREN mnemonic. (Link forward – Y5 revision of MRSGREN) Provide a selection of photos of living things, including the five vertebrate groups, invertebrates, flowering plants and grasses, and non-flowering plants. Tell children to sort the photos into the five vertebrate groups. Can they create/label any new groups with the leftover photos? (classify and present data in a variety of ways) Revise MRSGREN. Talk through/model how to use a classification key using a photo from last lesson. Then create a key as a whole class with children coming up with yes/no questions. 	<ul style="list-style-type: none"> Key Question: How can I improve my local environment? Recap on negative impact of one factor changing in habitat (food chain from last lesson). Emphasise that, unlike humans, plants and animals cannot easily relocate to new habitats if there is a negative change. Children generate questions to explore examples of natural changes (e.g. seasonal, flood, fire, earthquakes) and human changes (both positive and negative). Children explore, discuss and suggest ways to support habitats and explain why their suggestion is positive. Introduction to states of matter Link to prior learning – Y1, Y2 materials Key Question: Can you pour a solid? Sort a selection of materials – solids, liquids, gases. Include sugar (and/or salt/flour) + water in different forms as a solid/liquid/gas. Attribute properties to solids, liquids, gases, introducing 	<ul style="list-style-type: none"> Discuss freezing/boiling points of water - recap on particles. Demonstrate how to use a thermometer (THERM – Greek – ‘heat’). Measure and record temperatures in °C (Celsius) of icy water, tap water, hot water, boiling water (demonstration). Investigation: (comparative test) – Which substance has the highest melting point? Set up investigation to find and record the melting point of ice, margarine, butter and chocolate. Make predictions. Measure using thermometer °C. Record on bar chart and analyse/interpret results. (measure, record and present data using tables and charts; report on findings, including oral and written explanations and conclusions) Key Question: Why does it rain? Observe water evaporating and condensing (e.g. kettle boiling/steam on window); recap on particles/ state of matter. Link to geography + use secondary 	<ul style="list-style-type: none"> Link forward – Y6 Electricity * Vocab: CIRCUIT. Name/ picture match basic electrical components: cell/battery, wire, bulb, buzzer, motor/ Key Question: How can I make the bulb light up? Provide all components and challenge them to light up a bulb. Identify similarities in successes to establish idea of a complete loop. Children draw circuit; say why it worked. Role play to show directionality of current flowing around a circuit, addressing any misconceptions about movement of electrons. Picture predictions for four open/closed circuits, giving reasons. (ask relevant questions and use different types of scientific enquiries to answer them) Investigation: (comparative test) – Can I make a bulb light up without using wire? Planning – Children to suggest a range of everyday objects/materials for testing. Make predictions. (ask 	<ul style="list-style-type: none"> Link to prior learning – Y1 body parts associated with senses. Key Question: Why are some sounds louder than others? Children draw/write: How I think we hear sounds. Children play/listen to variety of instruments. Discuss preferences, pitch, and volume. Feel/see vibrations as instruments are hit/ blown/plucked. Vibrations (sound waves) = energy. Vary volume and link to strength of vibrations (louder sound = more energy) (ask questions and make careful observations to answer them; report findings, including causal explanations) Recap on link between hearing sounds and something vibrating. Recap on prior learning of states of matter – solids, liquids, gases. Key Question: Can sound travel through solid objects? Test sound travelling through wooden block, water, air. 	<ul style="list-style-type: none"> Link to prior learning – Y1 herbivores, carnivores, omnivores; Y2 food chains; Y3 food nutrition Recap on herbivore, carnivore, omnivore + simple food chains. Introduce terms: ‘producer’, ‘prey’, ‘predator’. Interpret given food chains using these terms. Construct own food chains. (record using simple scientific language, drawings, labelled diagrams) Zoom in on teeth. Show teeth from herbivores, carnivores, and omnivores including humans. Children speculate on functions of teeth, suggesting reasons for differences. Key Question: What animal would have this tooth? Label jaws of different animals, including human - identify types of teeth, their function, and herbivore/carnivore/ omnivore. (compare, suggest reasons for differences) Zoom in on human teeth. Recap four types of teeth. Children suggest things that

	<p>Evaluate effectiveness of their questions at each point. Can the children work in small groups to complete their own classification key for one plant/animal? (gather record, classify and present data in a variety of ways to help in answering questions)</p> <ul style="list-style-type: none"> Go into school grounds – what invertebrates can we find? Take photos/name these. Back in class, present children with Key Question: What is a slug? Use prepared classification key and photos to sort familiar and unfamiliar invertebrates: mollusc (slugs, snails), Annelida (earthworms), Arachnids, insects. Focus initially on the slug in order to answer the Key Question and then move on to other photos to group and classify in the same way. (identify and study plants and animals in the local environment; gather, record, classify and present data in a variety of ways to help in answering questions) Zoom in on local birds. Key Question: What bird is this? Provide children with photos of birds found in local environment but not named at this point: wood pigeon, magpie, crow, sparrow, jay, and jackdaw. Children create questions for a whole class classification key which could help Key Stage 1 children identify each bird. Test questions to ensure the key works. Children can add labels to their key as they identify each one. (identify and study plants and animals in the local environment; raise and answer questions; classify and present data in a variety of ways to help in answering questions) 	<p>the vocab Particles and answering the key question.</p> <ul style="list-style-type: none"> Link forward to Y5 Change of State (compare, suggest reasons for differences) Recap on previous lesson by role-playing how particles behave in solids, liquids, gases. Explore the changing states of water when heated and cooled Draw detailed diagrams explaining how behaviour of particles changes when a substance is heated/cooled. (give oral and written explanations) 	<p>sources to find out about the water cycle, associating the rate of evaporation/condensation with temperature. Draw detailed diagram explaining each stage. (record using simple scientific language, drawings, labelled diagrams)</p> <ul style="list-style-type: none"> Investigation (comparative/fair test). What can we do to speed up evaporation? Consider all the factors which may affect the rate of evaporation? How does temperature affect how towels dry? (Make predictions, what must we keep the same? Recording results in table/ bar chart. Presenting findings and drawing conclusions. 	<p>relevant questions; set up simple comparative tests)</p> <ul style="list-style-type: none"> Investigation (comparative test) – Record results in table – establish material not object that conducts electricity. Conclusion – use vocab of conductor and insulator. Discuss when insulators are needed – link back to safety – note coating on wires – use wire strippers to reveal copper beneath. (make systematic and careful observations; gather, record and present data using simple scientific language and tables; report on findings, including oral and written explanations and conclusions) Scientist: Walter Hawkins (1911 – 1992) – CHEMIST - invented the plastic coating on telephone wires, making universal service possible Zoom in on switches. Recap on the effect of conductors and insulators on simple circuits; consider why we may want to open a circuit and how we do this (switches). Children explore different types of switch, and discuss possible uses for each. Design a simple circuit that includes the best switch for a given purpose. (Use straightforward scientific evidence to support their findings and extrapolate their ideas. 	<ul style="list-style-type: none"> Recap on movement of particles in solids, liquids and gases – know that sound energy (vibrations) travels through particles to ear, and that this happens quicker through solids (because they are closer together) and slower through gas (further apart). Investigation: (pattern seeking) – Are higher sounds always quieter? Children explore pitch (speed of vibrations) using same objects but of different sizes (e.g. varying sized metal saucepan lids, rulers on table at different lengths, elastic bands of different thicknesses, different water levels in bottles). Measure and record pitch, varying volume. - Conclusion: pitch/speed of vibrations is determined by the shape of the object not the strength of the vibrations. (set up simple practical enquiries; take accurate measurements; gather, record and present data, using simple scientific language; present simple conclusions, using straightforward scientific evidence to support their findings) Recap on sound waves (energy) travelling through particles to ear. Discuss whether they think sounds get fainter the further you move away from them. Investigation: (comparative test) – Do sounds still get fainter if I move away in a different direction? - Plan, identifying variables, and predict Investigation – record and conclude. Place iPad playing music in the middle of the playground; children move away in different directions to prepared distances, recording loud, medium or quiet volume at 	<p>damage teeth + how to look after them.</p> <ul style="list-style-type: none"> Investigation: (changes over time) – Are fizzy drinks bad for our teeth? Initial yes/no responses + why. Explain egg/liquid experiment – children to suggest four liquids that could be used, considering the need for a range of effects on teeth. Take predictions/ reasons. (ask questions, suggest ways to answer them, set up simple practical enquiries) Set up egg/liquid experiment using liquids suggested by children. 3-4 days later, check eggs, gather/record results using tables/diagrams, draw conclusions, giving reasons and using scientific vocab (systematic and careful observations, record findings using tables, report on findings, draw simple conclusions) Link forward – Y6 recap of all human systems. Explain the term 'digestive system'. Children to draw: 'What I think the digestive system looks like'. Secondary sources - models/images of digestive system - ask questions to understand functions of main parts: mouth, tongue, teeth, oesophagus, stomach, small and large intestine, rectum, anus. Draw/label detailed diagram. (draw and discuss ideas, explore questions, record using scientific language and labelled diagrams) Retrieval of main parts of digestive system. Practical demonstration of function of these parts. Children to record (write/draw) explanation for each step using scientific vocab. (careful
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	<ul style="list-style-type: none"> • Link to prior learning: Y2 food chains; flowering plants; habitats and basic needs for survival • Key Question: Do we need invertebrates? Revise 'invertebrates' and 'habitat' + names of birds found in school grounds from last term. Children record: Why I think the school grounds are a good habitat for birds. Look at diet of six birds. Children use simple food chain model to answer question, explaining impact of removing invertebrates. (raise and answer questions; record conclusions and explanations using simple scientific language, drawings, labelled diagrams; use straightforward scientific evidence to answer questions or to support their findings) 				<p>each position. Share results – sound waves travel in all directions, getting fainter (less energy) the further they travel. - What do you think would happen if sound waves never lost their energy? (set up simple comparative tests; gather, record and present data, using simple scientific language; present simple conclusions, using straightforward scientific evidence to support their findings)</p>	<p>observations, oral and written explanations).</p>
National curriculum	<p>Living things and their habitats - 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.</p>	<p>Living things and their habitats - 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. 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.</p>	<p>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.</p>	<p>Electricity - 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.</p>	<p>Sound - 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.</p>	<p>Animals, including humans - 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.</p>

Year 5	Autumn		Spring		Summer
Key skills & ideas (disciplinary knowledge)	<p>Planning and Predicting Recognise that scientific ideas are based on evidence and creative thinking. Make predictions based on scientific knowledge. Suggest methods of testing including a fair test. Suggest how to collect evidence. Select suitable equipment.</p> <p>Investigating and Observing Carry out a fair test explaining why it is fair. Understand why observations need to be repeated. Select information from provided sources. Take measurements using a range of scientific equipment (including force metres and thermometers) with increasing accuracy and precision, taking repeated measurements where appropriate.</p> <p>Recording, analysing and evaluating Communicate findings in a variety of ways. Identify simple trends and patterns. Offer explanations for these trends and patterns. Communicate findings in tables bar charts and line graphs making appropriate use of ICT. Draw conclusions and communicate them with appropriate scientific language. Suggest improvements to their giving reasons. Use test results to make predictions and set up further comparative and fair tests. Report findings from enquiries including conclusions, causal relationships and explanation of and degree of trust in results.</p> <p>Written and Oral Expression: Explain processes, describe and explain patterns and draw conclusions using scientific terminology where appropriate. Present data, drawing conclusions. Report and present findings from enquiries including conclusions, explanations, data and diagrams.</p> <p>Responsibility: Work safely, objectively, responsibly, fairly and comparatively. Have understanding of how science can solve problems for example climate change and sustainability.</p> <p>Significance: Understand significant laws such as magnetism, heat conduction and others involving metals. Identify scientific evidence that has been used to refute or support ideas or arguments</p> <p>Similarity and Difference: Make comparisons, note differences and draw conclusions.</p>				
Key concept vocabulary	variable, fair test, evidence, conclusion, properties		Key topic vocabulary	life-cycle, childhood, adolescence, adulthood, puberty, reproduction, offspring, dissolving, separating, reversible, irreversible, thermal insulator, thermal conductor, gravity, resistance, friction, solar system, star, planets, orbit, rotate	
Focus / Enquiry question	Do all insects go through a metamorphosis?	How can I speed up or slow down a moving object?	What are the properties of materials and how to they influence their use?	How does the rotation and tilt of the earth affect our lives?	How do we change in our lives?
Learning objectives (substantive knowledge)	<ul style="list-style-type: none"> Recap on characteristics of life (MRSGREN). Zoom in on REPRODUCTION. Explain sexual reproduction involving two parents/egg and sperm. Revise characteristics of mammals. Investigation: (pattern seeking) - Do all mammals have the same life cycle? Research life cycle of a mammal of their choice. Discuss and compare findings to establish a rule for mammalian life cycles (3 stages: birth, young, adult) (identify evidence to support ideas or arguments) Recap on mammalian life cycles; discuss other familiar life cycles – chicken (bird), frog (amphibian), butterfly/moth (insect) – sexual reproduction. In groups, research the life cycles of other examples of birds and amphibians to establish rules: bird – 4 stages: egg, hatchling/young, fledgling/ juvenile, adult amphibian – 4 stages: egg, tadpole/larvae, young, adult (including metamorphosis) (identify evidence to support ideas or arguments) 	<ul style="list-style-type: none"> Link to Y3 forces – what is a force? Demonstrate balanced and unbalanced forces through pushes and pulls. Key question: The heavier the object, the faster it falls. Observe the effect of gravity on falling objects. Devise an investigation to prove or disprove the theory that heavier objects fall faster. Explain results and draw conclusions. (close observations, identify evidence to support ideas or arguments, pattern seeking) TEACHER'S NOTE – this statement is not correct: because gravity is a constant force, all objects fall at the same rate. The weight of an object will not affect the affect the speed at which it falls. Introduce the terms air resistance/water resistance and how these slow objects down. Link to previous lesson. Key question: How can we make the best parachute? Possible variables to explore and discuss – material used, size of parachute, shape of parachute, height of drop, (careful observations; take measurements with increasing 	<ul style="list-style-type: none"> Link to prior learning – Y1, Y2 materials; Y4 states of matter. Recap – establish difference between object, material, and property. Provide selection of everyday objects of various materials, including those that are transparent, reflective, and conduct heat/electricity. Discuss why these materials may have been chosen for their particular object/use. Draw/select image(s) of object(s) and label material and how its properties are key to its purpose. Sort materials according to their properties. Devise and carry out simple comparative test to compare simple properties such a flexibility, transparency, hardness- organise results using tables and discuss findings – consider any short comings of tests. Consider what is meant by thermal conductivity. Examine types of materials which keep cold things cold and hot things hot. Plan and carry out a fair test - Which material will keep my teachers drink the warmest for longest? Consider variables which need controlling- plan fair test. Each group to carry out investigation in same way to test reliability of results. Plot how liquid cools over time measuring temperature. Use of line graph to record. Draw conclusion and report on findings orally and in written form. Recap on properties of materials and states of matter/particles – ensure children recognise liquids and gases as materials, as well as solids. Investigation: (changes over time) – Does salt vanish when you put it in water? Make predictions. Plan and set up investigation - dissolve salt in water – record observations. Pour onto shallow dish, leave in warm place overnight, and observe/record evaporation of water and salt crystals left behind. Link to salt water in sea/sugar in tea – still taste salt/sugar even when dissolved, therefore not vanished.(present findings, including conclusions and explanations; identify evidence to support ideas or arguments) What questions can you ask about dissolving? Key question :What can speed up dissolving ? Revisit variables what could change effect dissolving ? Plan own question to investigate keeping all other factors the same – Plan and carry out a fair test to answer 	<ul style="list-style-type: none"> Link to prior learning: Y1 seasonal changes/varying day length Draw/label: My ideas about the Sun, Earth them to show a sense of size, movement, anything else they know. Key Question: Does the sun rise and set every day on Earth? Secondary sources/model - demonstrate heliocentric solar system: orbit of eight, roughly spherical planets, around a central star. Discuss Earth's rotation on a slanted axis leading to daytime and night-time. Through research and further discussion, children present/explain the movement of the Sun across the sky as a result of the Earth rotating. Key Question: If it's daytime in England, is it also daytime in Australia? Research, using secondary sources, the time of day in different places on Earth, comparing these across a world map as supporting evidence of the Earth's rotation. Create labelled diagrams to explain day and night in different 	<ul style="list-style-type: none"> Link to Y2/previous Y5 work on life cycles + PSHE Growing and Changing. Recap on life cycles and concept of growing and changing over time. Zoom in on humans to create an information timeline indicating developmental stages: infant, toddler, child, adolescent, adult, late adulthood (Changes at puberty covered through PSHE lessons/ Christopher Winter resources) Zoom in on human gestation. Research the stages of human gestation, making careful observations to label developmental stages for each trimester. Recap length/stages of human gestation period. Investigation: (pattern seeking) - Do larger mammals have longer gestation periods? Children discuss and decide how much data is needed to create a pattern in results, and what mammals would give an adequate size range (based on weight). Carry out

	<ul style="list-style-type: none"> • Revise life cycle of butterfly/ moth – 4 stages: egg, larva (caterpillar), pupa (chrysalis or cocoon), and adult – sexual reproduction. Link to amphibians – metamorphosis • Investigation: (pattern seeking) - Do all insects go through a metamorphosis? Carry out research, record table of results – name of insect, stages of life cycle, yes/no metamorphosis. Share and compare findings. Write an explanation of insect life cycles – complete metamorphosis (4 stages) and incomplete metamorphosis (3 stages). (present findings, including conclusions and explanations; identify evidence to support ideas or arguments) • Investigation: (changes over time) – Do all plants grow from seeds? Explore asexual plant reproduction using examples of tubers, runners, plants and bulbs. Create detailed diagrams of the life cycle of plants that reproduce sexually and plants that reproduce asexually. Identify similarities with life cycles of animals (germination, growth, reproduction, death) • Investigation: (changes over time). Children identify plants in their local area, looking for evidence of plant reproduction such as flowers, seeds heads, berries and fruits. They may also observe the types of pollinators in the vicinity or visiting the plants. Use photos and notes from observations to record their findings. Children to revisit the same plants each term to see if the signs of reproduction have changed with the seasons. 	<p>accuracy and precision; record data using scientific diagrams, labels, tables; present findings from enquiries, including conclusions, in oral and written forms)</p> <ul style="list-style-type: none"> • Investigate simple mechanisms involving pulleys (flagpoles, window blinds), levers (scissors, opening paint can, see saw) and gears (bikes). How can they help us to create a bigger force? Children draw diagrams to show levers, pulleys and gears, and explain how they help us to create a bigger force. (present findings from enquiries) 	<p>question – record findings in graph/ table form . Draw conclusions to answer question – comment on reliability of results.</p> <ul style="list-style-type: none"> • Recap on separation in last session. Explore how to separate different mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture. (plan different types of scientific enquiries to answer questions; report and present findings from enquiries, including explanations) Provide children with a mixture of salt, sand, paper clips and buttons which can be separated in different ways can they apply knowledge to separate these things • Recap on changes to materials: dissolving (Y5) evaporating, condensing, melting, freezing (Y4). Explain as reversible changes. Explore non-reversible changes – lighting a match/baking a cake, mixing bicarbonate of soda with vinegar, rust. Explain that irreversible changes always create a new material. Record reversible and non-reversible changes. (present findings, including conclusions and explanations; identify evidence to support ideas or arguments). 	<p>parts of the world at the same time. (report and present explanations in oral and written forms, identifying scientific evidence to support ideas or arguments)</p> <ul style="list-style-type: none"> • Zoom in on the Moon. List things that orbit the Earth. Establish moons as satellites of planets – Earth has one Moon, other planets have more. The Moon’s orbit of the Earth interacts with the Earth’s orbit of the Sun. Key Question: Why does the moon seem to change shape? Use models and secondary sources to demonstrate the elliptical orbit of the moon and how this means the moon is sometimes closer and sometimes further away. Address misconceptions, such as Moon as light source, being able to see ‘all’ of the Moon. Create detailed, labelled diagram of phases of the Moon. • Discuss the importance of evidence in scientific study and when presenting scientific theories and ideas. Discuss the evidence available to the early ASTRONOMERS: Aristotle and Ptolemy’s geocentric view compared with Copernicus and Galileo’s heliocentric ideas • Key Questions: Has the Earth ever been flat? Discuss shape of the Earth and how we know – evidence! Explain that the Earth was once believed to be flat, based on the evidence at the time, and that some people still believe this to be the case. Consider how current scientific ideas might develop in the future – how scientists need to understand the importance of 	<p>research on these grounds. Record results on table and graph. (research using secondary sources; record and present data using tables and graphs)</p> <ul style="list-style-type: none"> • Interpret data to write conclusion, including any anomalies. Use data to predict gestation periods of three animals of varying size not listed. Carry out further research to see if these fit the pattern. Analyse results to gauge whether data obtained could be extrapolated to make further predictions. (use data to make further predictions; report and present findings in oral and written form, including conclusions and causal relationships).
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				using evidence as proof but with the knowledge that this may change in the future when new evidence comes to light. This could be discussed in the context of other examples through history, e.g. evolution/fossils, germs and spread of diseases, DNA and forensic evidence, vaccinations and immunisations (recognise that scientific ideas develop and change over time; identify scientific evidence that has been used to support or refute ideas or arguments).	
National curriculum	Living things and their habitats – Describe the differences in the life cycles of a mammal, an amphibian, an insect, and a bird; describe the life process of reproduction in some plants and animals, including the comparison of those in the local environment with those in other parts of the world	Forces - Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object; identify the effects of air resistance, water resistance and friction that act between moving surfaces; recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	Properties and changes of materials - Compare and group together everyday materials on the basis of their properties; know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution; use knowledge of solids, liquids and gases to decide how mixtures might be separated; give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials; demonstrate 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.	Earth and Space - Describe the movement of the Earth, and other planets, relative to the Sun in the solar system; describe the movement of the Moon relative to the Earth; describe the Sun, Earth and Moon as approximately spherical bodies; use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	Animals, including humans - Describe the changes as humans develop to old age, including changes at puberty

Year 6	Autumn		Spring		Summer
Key skills & ideas (disciplinary knowledge)	<p>Planning and Predicting Make predictions based on scientific knowledge and understanding. Plan different kinds of scientific enquiry to answer questions including recognising and controlling variables where necessary. Suggest methods for testing including fair testing. Ensure data collected is appropriate and sufficient.</p> <p>Investigating and Observing Carry out fair test identifying key factors to be considered (identifying and controlling variables). Make a variety of relevant observations and measurements using simple apparatus correctly. Decide when observations and measurements need to be checked by repeating to give more reliable data. Select information from a range of sources.</p> <p>Recording, analysing and evaluating Communicate findings in tables, bar charts and line graphs while making appropriate use of ICT Identify trends and data in results that do not fit the expected pattern. Provide explanation for differences in observations and measurements. Draw conclusions and communicate them in appropriate scientific language. Record data and result of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line charts (in line with year 6 maths curriculum). Make practical suggestions how their investigative work could be improved. Based on results suggest further questions that could be investigated making predictions where relevant. Identify causal relationships in investigations. Begin to research evidence to support or refute ideas/arguments and begin to separate opinion from fact.</p> <p>Significance: Discuss theories of inheritance, evolution and adaptation and key scientists such as Linnaeus and Darwin. Identify scientific evidence that has been used to support or refute ideas or arguments Understand the importance of nutrition and a healthy lifestyle. Discuss the work of significant scientists.</p> <p>Written and Oral Expression: Group, classify, describe and explain patterns and use scientific terminology. Use scientific terminology, present and interpret data and explain processes.</p> <p>Continuity and Change: Describe and evaluate my own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources.</p> <p>Similarity and Difference: Group and classify based on similarities and difference. Make comparison, find patterns, note differences and draw conclusions.</p> <p>Cause and Consequence: Observe processes and link them to scientific ideas.</p> <p>Responsibility: Work safely and responsibly using a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate.</p>				
Key concept vocabulary	inheritance, classification, advantage, suited, relationship, reliable		Key topic vocabulary	micro-organism, adaptation, naturalist, refraction, voltage, cell, resistance, electrons, physical change, chemical change, circulatory system, blood vessel, mechanism	
Focus / Enquiry question	Why are fossils scientifically important?	Why is this animal in this group?	How does our circulatory system keep us alive?	How does light help us see?	Can a circuit contain more than one component?
Learning objectives (substantive knowledge)	<ul style="list-style-type: none"> Y2 animals and offspring; Y3 rocks and fossils; Y2 & Y4 habitats; Y5 reproduction in plants & animals Recap on reproduction of plants and animals from Y5 – most plants/animals are a mixture of characteristics from their parents. Explore further through identification of our own inherited physical characteristics and how these are not gender specific. Discuss which characteristics are passed on and which are acquired characteristics. Expand to, for example, dog breeds and crossbreeding (e.g. Labradoodles or Cockapoos). Revisit idea of inheritance and changes in offspring over time. 	<ul style="list-style-type: none"> Link to prior learning: Y1 vertebrate groupings; Y4 classification keys, invertebrate groupings Revise purpose of classification keys to sort and classify living things according to physical characteristics. Use a prepared classification key to sort and identify photos of unfamiliar micro-organisms, insects, molluscs, Annelids, fish, amphibians and mammals only using identifiable characteristics Key Question: Why is this animal in this group? Use the characteristics to establish what the same is and what is different across the groupings. (record data using classification keys; identify scientific 	<ul style="list-style-type: none"> Link to Y3 skeletal and muscular systems Y4 digestive system; Y1, Y4 classification of animals; Y3 food nutrition. Retrieval of knowledge of systems in the body (skeletal, muscular, digestive) – revise main body parts for each system (see curricular detail), their function and purpose. Briefly explain the purpose of the human circulatory system. Children to record: What I think the human circulatory system looks like. Use secondary sources to look at models/ images of circulatory system. Key Question: Why do we need blood in our bodies? Establish that 	<ul style="list-style-type: none"> Link to prior learning: Y3 light Revise light sources and that we need light to see. Draw diagrams to show light travelling from a light source to our eyes or from a light source reflecting from an object to our eyes. Key question: Does light travel in straight lines? Fair test – Can we see light from a torch through a curved or bent hosepipe? Children make predictions and carry out fair test, then log results and conclusion. (plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary; measure with increasing 	<ul style="list-style-type: none"> Scientist: Thomas Edison (1847 – 1931) – PHYSICIST – applying principles of organised science and teamwork to the process of invention and innovation Link to prior learning: Y4 Electricity. * Recap on vocab: CLOSED CIRCUIT OPEN CIRCUIT Build a simple circuit to light bulb. Investigation: (comparative test) - Does it matter how long the wires are? Planning stage to include children recognising and controlling the variables. Set up and complete investigation using a systematic approach. Report and present findings on the causal relationship between the length of wire (resistance) and brightness of bulb. Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary; (measure with increasing accuracy and precision; report and present findings from enquiries, including conclusions and causal relationships) Show recognised symbols for components in simple circuit diagram: cell, wires, bulb, motor, buzzer, and switch. Build a simple circuit to light bulb. Key Question: Can a circuit contain more than one component? Add another component (second bulb, or a buzzer or motor) - what happens? Repeat with further components. Try starting with one buzzer or one motor, then more components. Use recognised symbols to draw diagram of each circuit tested, starting with one component only.

<ul style="list-style-type: none"> Recap work on habitats – research animals or plants specifically suited to extreme environments (e.g. penguins, camels, cactus, and bromelia). Analyse advantages and disadvantages of these adaptations. Be clear about how these adaptations have come about over long periods of time. (present explanations in written forms, such as displays and other presentations) Scientist: Charles Darwin (1858 – 1937) – first evolutionary BIOLOGIST. Charles Darwin - revolutionary ideas, observations, evidence - challenging academic, societal cultural and religious norms. Zoom in on Darwin's Finches as a case study for evolution – beaks highly adapted to different food sources – adaptation leading to evolution. (recognise that scientific ideas develop and change over time; identify scientific evidence that has been used to support or refute ideas or arguments) (Pattern seeking) Model advantage of different beaks (pattern seeking). KEY QUESTION: How can beak shape help birds eat? Test impact of different shaped “beaks” of ability to grab food. Repeat measurements for accuracy and draw conclusion based on patterns observed. (repeat 	<p>evidence to support ideas)</p> <ul style="list-style-type: none"> Are plants classified too? Revise what makes a plant a plant – what characteristics can be considered in plants – root system, flowering – sort plants according to characteristics. How do we make a classification key? Look at how to create a branching diagram using observable characteristic (record information on classification key) Which living things can we not see? Explore what is meant by a microorganism or microbe – main types moulds, bacterias and viruses. Research positive and negative microorganisms. What conditions help micro-organism grow? Ask own questions about how we can prevent mould growing on our teacher's bread. List variables involved, write own question to investigate based on variables. Make simple prediction. Set up simple investigation and record change in bread over time. Draw conclusions and reflect on prediction (planning and carrying out fair test; making observations, recording, writing conclusions commenting on accuracy of results). Explore the Linnaean System of Classification and how this is one way of classifying all known organisms based on 	<p>the circulatory system is made up of three separate systems cardiovascular, pulmonary, and systemic). Explore and answer questions to understand the functions of the heart, blood vessels and blood, and how the circulatory system enables the body to function. Create an explanatory diagram of the circulatory system, labelling heart, lungs, arteries, veins, blood. Compare this to their original ideas. (report and present causal relationships and explanations)</p> <ul style="list-style-type: none"> Recap on key body parts, function and purpose of human circulatory system. Make explicit links with other known systems – oxygen to muscles allows movement of skeleton; nutrients from digestive system enables health and growth. (research using secondary sources; report and present findings from enquiries, including conclusions, in oral and written forms) Scientist: Marie M Daly (1921 - 2003) – BIOCHEMIST - developed understanding of how foods and diet affect the heart/circulatory system (Series of lessons) Investigation: 	<p>accuracy and precision; report and present findings from enquiries, including conclusions and causal relationships)</p> <ul style="list-style-type: none"> Key question: How can I see something that is behind me? Children investigate and observe using mirrors and draw diagrams to explain the path and reflection of light rays from light source to object to mirror to our eyes. (present explanations in written forms, such as displays and other presentations) Why might light look like it is bending – explore refraction – make observations of examples of refractions Key question: Why is a shadow the same shape as the object? Children investigate creating shadows with different objects and a light source and draw a diagram using straight lines to show how shadows are formed. Explore how to lengthen and shorten shadows by changing the position of the torch, but establish that the shadow's shape stays true to that of the object blocking the light because light travels in straight lines (pattern spotting, explanations of casual relationships) 	<ul style="list-style-type: none"> Write explanation and why - extra components share the energy therefore dim the light/lower the volume/slow the motor. (plan different types of scientific enquiries to answer questions; report and present findings from enquiries, including conclusions and explanations of causal relationships) Investigation: (pattern seeking) – How can I make the bulb brighter? Use conclusions of previous enquiries to suggest how to make a single bulb brighter in a simple circuit: increase number of cells, increase voltage, shorten wires (less resistance). Systematically test their ideas to prove/disprove. Test if this also works for maintaining brightness/ volume/speed when using multiple components. Conclude relationship between amount of power (input) and brightness/ volume/speed (output). (plan different types of scientific enquiries to answer questions; report and present findings from enquiries, including conclusions and explanations of causal relationships) Recap on input/output findings. Interpret simple circuit diagrams, including some with switches open and closed – position in order of output (brightness/volume) based on input (power). Explain giving reasons
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	<p>measurements, present findings, including conclusions and explanations; identify evidence to support ideas or arguments).</p> <ul style="list-style-type: none"> • Key Question: Why are fossils scientifically important? Explore fossils of plants and animals, ask questions. Can they identify any plants/animals? How do they know? Refer back to Mary Anning's ichthyosaur and how it supported the developing ideas of evolution (year3); fossils as evidence of change and evolution of species over millions of years recognise that scientific ideas develop and change over time; identify scientific evidence that has been used to support or refute ideas or arguments. 	<p>physical characteristics. Use the system to demonstrate the similarities between groups of animals (e.g. mammals, or Canada) until further subdivided into order or genus or species.</p> <ul style="list-style-type: none"> • Whole class research into an unfamiliar animal from a different habitat (look back to previous work) and explain where it belongs in the classification system. How is it the same as others of the same genus? How is it different? (careful observation of similarities and differences; identify scientific evidence to support ideas) 	<p>(comparison over time/pattern seeking) - Use knowledge of how the circulatory system transports water and nutrients around the body to consider the impact of exercise on the way their bodies function. Complete a daily 5-minute fitness challenge (e.g. laps of the playground) over a two week period. Measure pre/post pulse rate, count completed laps, record on table. Use results to draw conclusions about the effect of exercise on maintaining a healthy circulatory system. (take measurements with increasing accuracy and precision, including repeat readings when appropriate; record data and extrapolate results to form conclusions)</p>		
National curriculum	<p>Evolution and inheritance - Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago; recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents; identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</p>	<p>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, plants and animals; give reasons for classifying plants and animals based on specific characteristics.</p>	<p>Animals, including humans - Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood; recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function; describe the ways in which nutrients and water are transported within animals, including humans</p>	<p>Light - Recognise that light appears to travel in straight lines; use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye; explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes: use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</p>	<p>Electricity - Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit; compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches; use recognised symbols when representing a simple circuit in a diagram.</p>