Curriculum Knowledge & Skills Progression: Science

Reception

Biology		Physics		Chemistry	
Plants	**Animals including humans**				
Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
'Settling in' **'All about me'** **Megaboy** **Once there were Giants** **Funnybones**	*'Toys'* **A Chair for Baby Bear Nobot** **Robot** **T'was the Night Before Christmas**	*Traditional Stories* **A year on Adam's Farm** **The Three Little Pigs** **Three Billy Goats Gruff**	*Contemporary stories* **The Man on the Moon; a Day in the life of Bob Gruffalo** **Tree: Seasons Come, Seasons Go**	*Mini-beasts* **The Very Hungry Caterpillar** **The Tiny Seed** **What the Ladybird Heard**	*The World* **Handa's Surprise** **Atlases** **Bringing the Rain to Kapiti Plain** **Mama Panya's Pancake**

Beginning to think & work like Scientists (SKILLS)

In the EYFS, the characteristics of effective learning from the Statutory Framework for the Early Years Foundation Stage are the foundations on which the working scientifically skills build in Key Stage 1. While children are playing and exploring, teachers' model, encourage and support children in Reception class to do the following:

- **Explore/Observe over time**: look closely at /notice features in the natural world including animals and plants, weather and seasons, and natural materials e.g. water, ice, sand, stones, etc.
- **Question:** show an interest in and be curious about the natural world; ask questions about what they notice/observe or changes that occur e.g. changes to plants throughout the seasons
- **Describe**: talk about what they notice/observe e.g. features of animals, plants, natural materials, seasons, weather, etc; talk about changes they notice and changes over time, based on real experiences or books read to them at home or school
- **Record**: draw pictures e.g. observational drawings of plants, minibeasts; take photographs, make models or record in scrapbooks
- **Compare/sort/group/identify/classify** notice similarities/notice differences; talk about what they know and understand about similarities and/or differences; sort in to groups e.g. in relation to the natural world around them and other environments that have learnt about through real experiences or books read to them at home or school
- **Research:** talk to people (visits/visitors/family) and think of questions to ask to find out about plants, animals, seasons, processes; use first-hand experiences/ use secondary sources, e.g. books, photographs, internet
- **Equipment and measures:** use senses/use simple equipment to make observations, e.g. magnifiers, pipettes, egg timers, digital microscopes, etc.
- **Testing (including predicting):** talk about…what they think will happen if…?; What they think will happen next…?; make suggestions, show resilience, work with others
- **Explain:** talk about what they know and what they have learnt about the natural world. Talk about why things happen/occur in relation to different processes e.g. ice melting, seasonal changes.
- **Vocabulary**: use simple vocabulary to name and describe objects, materials, living things & environments.

EYFS Statutory Framework:
Understanding the World
ELG: People, Culture and Communities
Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps
Explain some similarities and differences between life in this country and life in other countries, drawing on knowledge from stories, non-fiction texts and – when appropriate – maps.
ELG: The Natural World
Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.

Enhanced Provisions:

- *Garden Area – Observing & Describing Seasonal Changes and the Weather - signs of Autumn/Winter/Spring/Summer*
- *Bug Hotel - exploring micro habitats for living things / drawing plants & animals*
- *Use of scientific equipment including magnifying glasses/digital microscope/ binoculars/pipettes/rulers/measuring spoons*
- *Exploring sand & water*
- *Observing, grouping – naming & sorting/classifying*
- *Asking questions & using secondary sources including books & the internet to answer questions*
- *Naming & describing the material objects are made from*
- **Explore the natural world around them, wellie walks, garden afternoons, local walk**
- **Make observations of the weather and how it affects the environment**

Intent: • Not know and name parts of the body • To know the names of the 5 senses • To understand 'Healthy me' – including diet, exercise and oral hygiene.	**Intent:** • To understand and name the forces of pushing and pulling. • To know how to build ramps and begin to understand how changing them can make cars go faster/further. • To observe how we make balls bounce higher and talk about what they discover. • To understand that a material is what an object is made out of and to name and explore their properties through their topic of Toys.	**Intent:** • To observe and understand changes in matter through cooking – gingerbread making and through observing and experimenting with changing materials in different contexts. • To know what plants need to grow by planting beans.	**Intent:** • To know the names of the planets in our solar system, the Sun and the moon	**Intent:** • Explore and observe habitats of minibeasts and to know that a habitat provides everything the minibeast needs to survive. • To know and be able to talk about the lifecycle of a butterfly. • Observe the different characteristics of a variety of minibeasts and understand that they can be grouped/classified by	**Intent:** • To know some similarities and differences between the natural world around them and contrasting environments including weather.

					e)them.	
Working Scientifically TAPS	**Senses walk (DO - Observe and Measure)** https://pstt.org.uk/download/2494/?tmstv=1676973986 **Scoop sounds (Plan – ask q's+ plan enquiry** https://pstt.org.uk/download/2437/?tmstv=1676971751	**Toy Forces (Review - interpret, Record & Evaluate)** https://pstt.org.uk/download/2427/?tmstv=1676971541	**Mix Materials (D0 – set up an enquiry** https://pstt.org.uk/download/2490/?tmstv=1676973904 **Frozen Balloons (Do Observe and Measure)** https://pstt.org.uk/download/2550/?tmstv=1676975488	**Bubble Snake (Review – Evaluate)** https://pstt.org.uk/download/2486/?tmstv=1676973823	**Scavenger Sort (Do – record)** https://pstt.org.uk/download/2577/?tmstv=1676976724	**A shelter for Incy (Do – Set up an enquiry)** https://pstt.org.uk/download/2554/?tmstv=1676975584
	Key Vocabulary taste, smell, touch, taste, hear & see head, eyes, eye lashes, eye brows, ears, nose, mouth, hair, teeth, tongue, neck, shoulders, arms, elbows, hands, fingers, thumbs, body, stomach, legs, knees, toes, feet, ankle healthy, unhealthy, food, fruit, vegetable, diet, sleep, clean, brush, medicine.	**Key Vocabulary** Push, pull, faster, slower, higher, lower, harder, softer, material, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, wool, clay wood, plastic, metal, rubber, smooth, rough.	**Key Vocabulary** Hot cold, water, ice, liquid, solid, set, heat, cook, freeze. Sunlight, water, stem, root(s), flower, leaf, leaves, bean, seed.	**Key Vocabulary** Space, stars, universe, solar system, sun, moon, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, telescope, satellite.	**Key Vocabulary** Caterpillar, egg, cocoon, butterfly, life cycle Variety of minibeasts found in our garden. E.g. worm, spider, ladybird, snail. Wings, legs, shell, antennae etc. Habitat	**Key Vocabulary** Hot, cold, warm, wet, dry, Rain, snow, fog, sunny. Same, different.

Year 1 Oak class

Unit	**Throughout the year** **Seasonal Change**
Intent	In this unit of work the children will explore the world around them by asking and answering questions about the weather. They will work scientifically by observing and recording changes to the weather, their environment and clothing those around them wear throughout the seasons. They will use non-standard units to record evidence for comparative tests e.g. rainfall.
Key Knowledge	• In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again. • The weather also changes with the seasons. In the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer. • The change in weather causes many other changes. Some examples are: numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people.
Key Skills	 **Asking simple questions and recognising that they can be answered in different ways**. While exploring the world around them children develop their ability to ask and answer questions about how things change and how it happens. **Making observations and taking Measurements.** They begin to take measurements, initially by comparisons, then using non-standard measurements. **Engaging in Practical enquiry.** The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out comparative tests and make observations over time. **Recording and presenting evidence.** The children record their observations with photographs and drawings. They record their measurements using prepared tables and block graphs**.** **Answering questions and concluding.** The Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported by their teachers to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources. **Working scientifically: (Do - record) https://pstt.org.uk/download/2554/?tmstv=1676975584**
Key Vocabulary	**Weather (sunny, rainy, windy, snowy etc.) Seasons (winter, summer, spring, autumn) Sun, sunrise, sunset, day length**
Prior Learning	• Understand the key features of the life cycle of a plant and an animal. (Nursery – Plants & Animals, excluding humans) • Explore the natural world around them. (Reception – Seasonal changes) • Describe what they see, hear and feel whilst outside. (Reception –Seasonal changes) • Understand the effect of changing seasons on the natural world around them. (Reception – Seasonal changes)
Future Learning	• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 - Earth and space) • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3)
Suggested Sequence of lessons	One science lesson per half term should be dedicated to exploring seasonal change. These activities should include measuring temperature and rainfall, garden walks looking at/observing/counting flora and fauna, collecting data on the length of the day and collecting information such as the type of clothing worn by those around them. The children should pick a particular tree in the garden and visit it weekly to notice & observe small changes. Create a tree diary collecting leaves, seeds, photographs and record observations. This could be part of the floor book science. As the lessons build, contrast/change should be discussed and explored. **Common misconceptions to be aware of:** Some children may think: • it always snows in winter • it is always sunny in the summer • there are only flowers in spring and summer • it rains most in the winter.
Assessment task/evidence	• Can name the four seasons and identify when in the year they occur. • Can describe weather in different seasons over a year. • Can describe days as being longer (in time) in the summer and shorter in the winter. • Can describe other features that change through the year. The science floor book would be a good way to collect this information and record the children's observations and knowledge.

Term	Autumn Materials	Spring Animals, including humans	Summer Plants
Intent	In this unit of work children will…explore, name, discuss and raise questions about everyday materials so that they become familiar with different materials names and properties. Pupils explore and experiment with a wide variety of materials. Pupils work scientifically by performing simple tests to explore questions	In this unit of work children will become familiar with common names of some fish, amphibians, reptiles, birds and mammals. Pupils work scientifically by using their observations to compare and contrast animals at first hand or through videos and photographs. They will describe how they identify and group them. They group animals according to what they eat, where they live, how they move. They will use their local environment to explore and answer questions about animals in their habitats. They will have opportunities to learn the names of the main body parts through games, songs and rhymes. Children work scientifically to observe or gather and record data to answer questions e.g. does the tallest person have the biggest hands?	In this unit of work children will use our school garden to explore and answer questions about plants growing in their habitat. They will observe the growth of vegetables and flowers that have been planted. They will become familiar with the names of flowers and trees and plant structures in our garden. They will work scientifically by observing closely, comparing and contrasting familiar plants; describing how they were able to identify and group them. Pupils will keep simple records about how plants have changed overtime e.g. leaves falling, spring regrowth and buds, flowering.
Key Knowledge	By the end of this unit pupils will: • Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their simple physical properties.	**By the end of this unit pupils will:** • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	**By the end of this unit pupils will:** • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees
Key Skills	**Asking simple questions and recognising that they can be answered in different ways.** While exploring different materials, the children develop their ability to ask questions (such as what something is, how things are similar and different, which alternative is better. Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. E.g. Which material would make a better rain shelter? Why? • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered. **Engaging in practical enquiry to answer questions.** • Children use their observations and testing to compare materials. • They sort and group materials identifying their own criteria for sorting. 	**Identifying and classifying**  • Children use their observations and testing to compare living things. • They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living things. • They describe the characteristics they used to identify a living thing. **Answering Questions & Concluding** • Using their observations and ideas to suggest answers to questions, children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made or information they have gained from secondary sources. E.g. This is a fish because….  **Recording and Presenting Evidence** • They classify using simple prepared tables and sorting rings	**Identifying and classifying**  • Children use their observations and testing to compare living things. E.g. Do all flowers have the same number of petals? • They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living things. • They describe the characteristics they used to identify a living thing. **Gathering and recording data to help in answering questions** • The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. (Growing from seeds, plants in the garden number of – how many daffodils?  • They classify using simple prepared tables and sorting rings. ***Link to work on seasons and observations of plants in the garden.***
Key Vocabulary	**Vocabulary:** ***material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, wool, clay, rubber, hard/soft, stretchy/stiff, shiny/dull, rough/smooth, bendy/not bendy, waterproof, not waterproof, absorbent/not absorbent, see through/not see through, breaks, tears***	**Vocabulary:** ***fish, amphibians, mammals, birds, reptiles, pets, omnivores(with examples) meat and plants, carnivores (with examples) meat, herbivores (with examples) plants, head, neck, body, arms, elbow, legs, knees, face, ears, eyes, hair, mouth, teeth, tail, claw, fin, scales, feathers, fur, beak, paws, hooves, Senses: tongue-taste, nose-smell, eyes – sight, skin – touch, ears - hearing***	**Vocabulary:** ***wild plants, garden plants, deciduous, evergreen, leaf, root, leaves, bud, flowers, blossom, petals, root, stem, deciduous, evergreen, trunk, branches, leaf, root, fruit, vegetables, bulb, seed, bark, stalk, bud and the names of trees, flowering and wild flowering plants in the school garden***
Prior Learning	• Use all their senses in hands-on exploration of natural materials. (Nursery - Materials, including changing materials) • Explore collections of materials with similar and/or different properties. (Nursery - Materials, including changing materials) • Talk about the differences between materials and changes they notice. (Nursery - Materials, including changing materials)	• Use all their senses in hands-on exploration of natural materials. (Nursery - Humans) • Name and describe people who are familiar to them. (Reception-Humans)	• Plant seeds and care for growing plants. (Nursery – Plants) • Understand the key features of the life cycle of a plant and an animal. (Nursery – Plants) • Begin to understand the need to respect and care for the natural environment and all living things. (Nursery – Plants) • Explore the natural world around them. (Reception – Living things and their habitats) • Recognise some environments that are different to the one in which they live. (Reception – Living things and their habitats)

Future Learning	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	• Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. (Y2 - 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. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)	Observe and describe how seeds and bulbs grow into mature plants. (Y2- Plants) • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants) • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats) • Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants) • Investigate the way in which water is transported within plants. (Y3 - Plants)
Suggested Sequence of lessons	1. Floor book discussion to assess prior learning. 2. Identify different materials. 3. Classify objects made of one material in different ways e.g. a group of objects made of metal. 4. Classify in different ways one type of object made from a range of materials e.g. a collection of spoons made of different materials. 5. Classify materials based on their properties. 6. Reflectiveness - **Plan -ask Q's and plan an enquiry** 7. Test the properties of objects e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness of shelters. 8. Bridge Material Testers **Do - record** 9. Floating and Sinking **Plan/DO -Set up an enquiry** **Common Misconceptions to be aware of:** *Some children may think:* *• only fabrics are materials* *• only building materials are materials* *• only writing materials are materials* *• the word 'rock' describes an object rather than a material* *• 'solid' is another word for hard*	1. Floor book discussion to assess prior learning. 2. Sing songs and rhymes about the body. Activity to label different body parts. 3. Senses walk - what can I hear, see, touch and smell? Children record. 4. Taste & smell activity - children record 5. Human Body Parts **Review – interpret, report & evaluate** 6. Hypothesize – I think I will have the biggest hands because I am the tallest. – test – record – draw a conclusion from their findings. Human Handspans **Review – interpret, report & evaluate** 7. Animals naming and sorting by own criteria e.g.legs/no legs; fur/no fur; tail/no tail 8. Explore characteristics of different living things e.g. fish, what do all fish have? – label. Repeat for amphibians, reptiles, birds and mammals. Children are then given an animal which they must classify and say why. 9. Animal classification **Review – interpret, report & evaluate** 10. Explore using videos and books what different animals eat (herbivore, carnivore and omnivore). Children record what they find out. Link to Zoo visit in Apple class. 11. Children group animals by what they eat and use labels carnivore, herbivore and omnivore. **Common Misconceptions to be aware of:** **Some children may think:** • **only four-legged mammals, such as pets, are animals** • **humans are not animals** • **insects are not animals** • **all 'bugs' or 'creepy crawlies', such as spiders, are part of the insect group** • **amphibians and reptiles are the same.**	**Throughout the year the children will have visited the garden often and observed their tree. They will have noticed how it has changed and compared it to evergreen trees in the garden (Conifer). This unit will draw significantly on that knowledge and experience.** 1. Floor book discussion to assess prior learning. 2. Exploring the garden to identify and group flowers/trees. 3. Compare different leaves, flowers or blossoms – what do the children observe? 4. Pull up flowers that have been classified as weeds to find and explore different parts of the flower root, stem, flower, bud etc. Plant Structure **Do -Observe & measure** 5. Explore the different trees in the garden and identify roots, trunk, branches leaves – Explore leaf structures. **Do – Observe and Measure** 6. Explore the flowers. Do all flowers have the same number of petals? – Record observations in a simple chart. 7. Plant sunflowers/beans or beans and predict what they will see. 8. Plant them in the flower bed when they grow too big for the classroom and measure each week. 9. Revisit the tree diary and discuss and explore trees which lose their leaves – introduce deciduous and evergreen. Take the children on a tree hunt can they identify the evergreen and deciduous trees in our garden? **Common Misconceptions to be aware of:** **Some children may think:** • **plants are flowering plants grown in pots with colored petals and leaves and a stem** • **trees are not plants** • **all leaves are green** • **all stems are green** • **a trunk is not a stem** • **blossom is not a flower.**
Assessment task/evidence	• Can identify a particular material for a purpose due to its properties and say why.	• Without support can label the basic parts of the human body including those which are associated with the senses. • Identify an animal from each of the vertebrate groups and describe their structure. They can identify what an animal eats and say whether it is a plant, animal or both.	• Design their own flower or tree and label it. Describe how it might change over time.

Year 2 Elm Class

Term	Autumn 1	Autumn 2	Spring	*Summer*
Observe plants and animals in the school grounds over time	Plant bulbs	Revisit habitat to note what has changed.	Bulb growth diary	Revisit habitat to note what has changed.
Unit	**Uses of Everyday Materials**	**Animals including Humans**	**Living Things and Their Habitats**	**Plants**
Intent	In this unit of work children will identify and discuss the uses of everyday materials so that they become familiar with how some materials are used for more than one thing, or how different materials can be used for the same thing. They will think about the properties of materials that make them suitable or unsuitable for particular purposes. Pupils work scientifically by comparing the uses of materials, comparing materials, recording observations through tests they devise.	In this unit of work children will be introduced to the basic needs of animals for survival. They will be introduced to the basic reproduction cycle. Pupils work scientifically by making observations in real experiences and through the use of secondary sources. They will ask questions and find possible ways of answering them.	In this unit of work the pupils will build upon their knowledge of basic needs for survival and link this to habitats. They will be able to describe a simple food chain. The pupils will work scientifically by asking and answering questions about the suitability of habitats, then drawing a conclusion. They will record their knowledge in simple diagrams and charts.	In this unit of work children will use the school environment to observe how plants grow. Children will be introduced to the requirements of plants for germination, growth and survival, as well as the processes of reproduction in plants. Pupils work scientifically by observing and recording the growth of a variety of plants. They devise and set up comparative tests to show what plants need to stay healthy.
Key Knowledge	• identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • find out how and know that the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	• To know about and describe the basic needs of animals, including humans, for survival (water, food and air) • To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene • To know that animals, including humans, have offspring which grow into adults.	• To know and compare the difference between things that are living, dead, and things that have never been alive. • To know that most living things live in habitats to which they are suited and describe how different habitats. provide the basic needs of different kinds of animals and plants, and how they depend on each other. • identify and name a variety of plants and animals in their habitats, including micro-habitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.	• observe and describe how seeds and bulbs grow into mature plants. • find out, understand and describe how plants need water, light and a suitable temperature to grow and stay healthy.
Key Skills	**Asking simple questions and recognising that they can be answered in different ways** • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered. **Engaging in practical enquiry to answer questions** **Performing simple tests** • The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out comparative tests	**Asking simple questions and recognising that they can be answered in different ways** • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. What would we need to survive on the moon? • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered. Which exercise was the most effective? What does your data show? **Making observations and taking measurements** **Observing closely, using simple equipment** • Children explore the world around them. They make careful observations to support identification, comparison and noticing change.	**Using their observations and ideas to suggest answers to questions** • Children use their experiences of the world round them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources. **Identifying and classifying** • Children use their observations and testing to compare living things. They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.	**Asking simple questions and recognising that they can be answered in different ways** • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered. **Making observations & taking measurements** **Observing closely, using simple equipment** • Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. • They begin to take measurements, initially by comparisons, then using non-standard units. **Engaging in practical enquiry to answer questions** **Performing simple tests** • The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: comparative tests; pattern seeking enquiries; and make observations over time

	Identifying and classifying • Children use their observations and testing to compare objects and materials. They sort and group these things, identifying their own criteria for sorting. **Recording & Presenting evidence** **Gathering and recording data to help in answering questions** • The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. **Answering questions and concluding** **Using their observations and ideas to suggest answers to questions** • The children recognise 'best and worst' etc. from their data.	• They begin to take measurements, initially by comparisons, then using non-standard units. **Using their observations and ideas to suggest answers to questions** • The children recognise, 'best and worst' etc. from their data.		**Recording and presenting evidence** **Gathering and recording data to help in answering questions** • The children record their observations e.g. using photographs, drawings, labelled diagrams, prepared tables or in writing. **Answering questions and concluding** **Using their observations and ideas to suggest answers to questions** • Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources.
Key Vocabulary	wood, metal, plastic, glass, brick, rock, paper, cardboard, pushing, pulling, squashing, bending, twisting, stretching, opaque, translucent, transparent, reflective, non-reflective, flexible, rigid	offspring, grow, adults, water, food, (meat, fish, vegetables, pasta, bread, rice) air, exercise, heartbeat, breathing, hygiene, germs. Disease, nutrition, reproduce, egg, chick, chicken, egg, caterpillar, cocoon, butterfly, spawn, tadpole, frog, baby, toddler, child, teenager, adult	living, dead, never alive, habitats, micro-habitats, food, food chain, sun, grass, cow, human, alive, healthy, feed, move, suited/suitable, basic need, logs, leaf litter, stony path, under bushes, shelter, seashore, woodland, ocean, rainforest, conditions: hot/warm/cold, dry/damp/wet, bright/shade/dark	wild plants, garden plants, deciduous, evergreen, leaf, root, leaves, bud flowers, blossom petals, root, stem, grow, healthy, deciduous, evergreen, trunk, branches, fruit, vegetables, bulb, seed, water, light, suitable, shade, sun, cool, warm
Prior Learning	• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials	• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - 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. (Y1 - Animals, including humans)	• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals including humans) • Describe and compare the structure of a variety of common animals (fish, • amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans) • Observe changes across the four seasons. (Y1 - Seasonal changes)	• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)
Future Learning	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks) • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets) • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and of materials) • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials)	• 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. (Y3 - Animals, including humans) • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)	• Recognise that living things can be grouped in a variety of ways. (Y4 Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats) Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)	• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants) • 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. (Y3 - Plants) • Investigate the way in which water is transported within plants. (Y3 -Plants) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)

Suggested Sequence of lessons	1. Activity to assess prior knowledge e.g. Mind map of materials. Feely bag activity using adjectives to describe materials and their properties and immerse the pupils in appropriate vocabulary. Materials hunt where children have to identify the material and describe a property e.g. glass it was smooth. 2. Children investigate a range of objects. Materials Hunt **Do – Record** 3. Follow on with a list of objects made out of unsuitable materials - pupils must identify the materials properties and say why it is not suitable for the purpose. 4. Children explore how a material can be changed (playdough) twist, stretch, bendy, flatten. They then compare them with other materials to see if they can be 'changed' and identify which materials are rigid and stiff. 5. Children then investigate different materials to test for stretch, rigidity and flexibility. 6. Children investigate materials that would be suitable for a tent cover. **Waterproof - Plan – ask Q's & Plan Enquiry** 7. Children are given a list of objects and test for particular properties to find out why they have been made out a particular material or materials and then suggest another purpose the material could be used for. E.g. a metal paper clip or a drinking glass. **Some misconceptions to be aware of:** **Some children may think:** **• only fabrics are materials** **• only building materials are materials** **• only writing materials are materials** **• the word rock describes an object rather than a material** **• solid is another word for hard.**	1. Give the children a context and assess prior learning of what humans need to survive e.g. a trip to the moon. What would they need to take with them so that they can survive? 1. Compare what is needed to survive and what is needed to make them happy. Define what it means to survive. 2. A range of sorting activities for children to discuss and learn about what is healthy (foods) 3. Discussion about food groups and healthy plates. Pupils design their own healthy plates and compare them with those of others. **4.** Exploration and discussion about exercise on the body and why it is needed to stay healthy. Children plan an enquiry to establish the 'best' type of exercise. Pupils record findings in simple charts and draw a conclusion. Plan & Do - **– ask Q's & Plan Enquiry/Record** 5. Discussion on hygiene and the need for cleaning teeth and washing. This could be set in the context of their trip. What advice would they give to another space traveler for good hygiene? 6. Incorporate a visit from a parent with a baby – children devise questions to establish the needs of the baby and how the mother looks after the child and it's needs. 7. Link this visit to thinking about other animals' offspring. Matching babies to their mothers. Link this to previous learning when children hatched caterpillars and observed them turn into butterflies. **Misconceptions to be mindful of:** • **Some children may think:** • **an animal's habitat is like its 'home'** • **all animals that live in the sea are fish** • **respiration is breathing** • **breathing is respiration.**	1. Activity to assess prior learning. 2. find and sort a range of items that are living, dead and never lived. Living and NON **Review – Interpret, Report Evaluate** 3. Studies of a habitat and a microhabitat and the animals and plants that live in them. Woodlice Habitat **Do – Record** 4. **Nature Spotters Review – interpret and report** 5/6 Talk about how the features of these animals and plants make them suitable to the habitat. Describe what the animals eat in a habitat and how the plants provide shelter for them. Animal Home Build **Plan – ask Q's & Plan Enquiry** 7 Construct a food chain that starts with a plant and has the arrows pointing in the correct direction. 8 Feeding simulation **Plan & Do – Set up an enquiry** **Some misconceptions to be aware of:** **Some children may think:** **• an animal's habitat is like its 'home'** **• plants and seeds are not alive as they cannot be seen to move** **• fire is living** **• arrows in a food chain mean 'eats'.**	1. KWL grid to draw on previous knowledge of plants (assessed and knowledge recapped if required and any misconceptions identified) 2. **Plant Growth DO – Observe & measure** children will need to record effects over time – discuss how to do this with the children. 3. Comparison of a variety of seeds and bulbs 4. Close observational pictures of seeds and bulbs using magnifying glasses and digital microscopes. What do the children notice? 5. Compare seeds and bulbs - play the odd one out (floor book) 6. Revisit planting of bulbs in the autumn term (daffodils) and the growth diary they kept. The children plant lily bulbs in pots and predict what changes will occur. 7. Collate and compare results from the enquiry set up in session 2 and draw conclusions. Children record a conclusion based on their findings. A plants needs …… **Some misconceptions to be aware of:** **Some children may think:** **• plants are not alive as they cannot be seen to move** **• seeds are not alive** **• all plants start out as seeds** **• seeds and bulbs need sunlight to germinate**
Assessment task/evidence	Children are given a problem to solve. They need to help a pirate with his list of equipment he needs. Such as a cutlass, a pirate flag etc. The children have to write to him to tell him which material the objects should be made out of and why using appropriate vocabulary	Pupils create a guide for any aliens they meet about humans. They should include the different stages of growth, what they need to survive and stay healthy.	**Describe why an animal is not suitable for a particular habitat and/or create an animal and a habitat giving reasons why the habitat is suitable**	Pupils can create a 'how to' guide for Mrs. Shoulder to keep her plants alive in the office.

Year 3 - Beech Class

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit	**Animals Including Humans**	**Animals Including Humans**	**Light**	**Forces & Magnetism**	**Plants**	**Rocks & Soils**
Intent	In this unit of work children will continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles. They will learn that humans and some other animals have skeletons and muscles for support, protection and movement.		In this unit of work pupils will explore what happens when light reflects off a mirror or other reflective surfaces, to help them to answer questions about how light behaves. They should look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change.	In this unit of work children will observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary. They will explore the behavior of magnets. Pupils will work scientifically by comparing how different things move; 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; 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.	In this unit of work children will be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.	In this unit of work children will explore different kinds of rocks and soils including those in the local environment. Pupils might work scientifically by observing rocks, including those used in the environment, exploring how and why they have changed over time. They might use hand lenses to identify and classify rocks. Pupils could explore different soils and identify similarities and differences between them. They could raise and answer questions about how soils are formed.
Key Knowledge	• To know that humans and some other animals have skeletons and muscles for support, protection and movement	• To know that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food	• recognise that they need light in order to see things and that the dark is the absence of light. • Know that light is reflected from surfaces. • recognise that light from the sun can be dangerous and know that there are ways to protect their eyes • know that shadows are formed when the light from a light source is blocked by a solid object • by finding patterns in the way that the size of shadows changes know how to enlarge and reduce the size of a shadow	• compare how things move on different surfaces • to know 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 know that magnets attract some materials and not others • compare and group together a variety of everyday materials on the basis on whether they are attracted to a magnet, and identify some magnetic materials • to know and describe magnets as having two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing	• identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • through exploration know 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 and show their understanding by describing it. • Explore and understand the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • To understand and describe in simple terms how fossils are formed when things that have lived are trapped within rock • To know that soils are made from rocks and organic matter
Key Skills	**Identifying differences, similarities or changes related to simple scientific ideas and processes.** • They draw conclusions based on their evidence and current subject knowledge.	**Engaging in practical enquiry to answer questions.** **Setting up simple practical enquiries, comparative and fair tests** • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out: observations and simple fair tests to compare and observe. They look for	**Making observations and taking measurements** • The children make systematic and careful observations. • They use a range of equipment for measuring. They use standard units for their measurements. **Recording and presenting evidence** • Recording findings using simple scientific language, drawings, labelled diagrams, bar charts,	**Recording and presenting evidence** • Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. **Answering questions and concluding** • Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.	**Making observations and taking measurements.** - The children make systematic and careful observations using standard measurements. **Engaging in practical enquiry to answer questions.** - Children select from a range of practical resources to gather evidence to answer questions generated by themselves or	**Asking questions and recognising that they can be answered in different ways.** • They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question. (soils) **Using straightforward scientific**

		and identify patterns. **Answering questions and concluding.** **Using straightforward scientific evidence to answer questions or to support their findings:** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence.	and tables • The children decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. • They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). • Children are supported to present the same data in different ways in order to help with answering the question. **Communicating their findings** • Children communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.	• Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.	the teacher. - They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. **Answering questions and concluding.** - Using results to draw simple conclusions and raise further questions. They draw conclusions based on their evidence and current subject knowledge.	**evidence to answer questions or to support their findings.** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence.
Key Vocabulary	skeleton, Endoskeleton, Exoskeleton, Hydrostatic Skeleton. bones, muscles – relax, contract, joints ball, socket, hinge & gliding sockets, support, protect, move, skull, ribs, spine	nutrition, nutrients, carbohydrates, sugars, protein, fats, fibre, water, vitamins, minerals	light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous	force, push, pull, twist, contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole	Photosynthesis, pollen, insect, wind, pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal, **conclusion**	rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, permeability, density, durability, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil, igneous, metamorphic, sedimentary
Prior Learning	• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans) • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)		• Explore how things work. (Nursery Light) • Talk about the differences in materials and changes they notice. (Nursery - Light) • Describe what they see, hear and feel whilst outside. (Reception – Light) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials)	• Explore how things work. (Nursery – Forces) • Explore and talk about different forces they can feel. (Nursery - Forces) • Talk about the differences between materials and changes they notice. (Nursery – Forces) • Explore the natural world around them. (Reception – Forces) • Describe what they see, hear and feel whilst outside. (Reception - Forces) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	• Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants) • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants)	Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)
Future Learning	• Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans) • Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans) • Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)		• Recognise that light appears to travel in straight lines. (Y6 - Light) • 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. (Y6 - Light) • 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. (Y6 - Light) • Use the idea that light travels in straight lines to explain why	• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 - Forces) • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 - Forces) • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 - Forces)	• Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)	• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance)

			shadows have the same shape as the objects that cast them. (Y6 - Light)			
Suggested sequence of lessons	1. Initial assessment of prior knowledge 2. To identify and describe the different types of skeleton. Explore and compare animals to their skeletons by exploring a description and images of an Endoskeleton, Exoskeleton and Hydrostatic Skeleton. 3. Identify similarities and differences between animals and their skeletons through discussion and looking at different images. To know that humans and some other animals have skeletons for support, protection and movement. Explore the importance of skeletons for protection, what would happen if we did not have skeletons? 4. Identify that humans and some other animals have skeletons by identifying the parts of the skeleton. Use secondary sources to research the parts and functions of the skeleton. 5. Identify and name the main bones in the body by exploring images and building on the knowledge from the previous session. 6. Investigate patterns - Investigating skeletons **Plan – Asking Q's and plan an Enquiry** 7. To explain how muscles work and build on previous lessons work on how our skeletons help us move and begin to explore what muscles are. Where do we have muscles in our body? Discuss the difference between skeletal muscles which help us move and are voluntary movements and organs whose movement is involuntary. How do muscles work? Discuss pairs of muscles which work together by contracting and relaxing to enable movement. Children try out different actions and predict which muscles are being used when they make the actions. Children record their findings. **Some misconceptions to be aware of:** Some children may think: • snakes are similar to worms, so they must also be invertebrates • invertebrates have no form of skeleton	1. Initial assessment of prior knowledge 2. To identify and understand that humans need the right types of nutrients. Explore and identify the main food groups and the different nutrients found in food. Use secondary sources to find out the types of food that contain the different nutrients. 3. Investigate and discuss what makes a balanced meal. Use food labels to explore the nutritional content of a range of food items. Children explain their findings through drawing a healthy meal. 4. To understand that animals including humans need the correct balance of nutrients. Explore and identify how much of each nutrient human's need. Compare the nutrients that humans need at different stages of life. 5. To understand that our bodies need exercise as well as the right types of food to be healthy. How does exercise change our bodies? Plan and carry out an investigation into the effects of various types of exercise- running, yoga, reading, throwing and catching. Discuss variables and how to make it a fair test. Predict which activity will cause the most changes and what the changes will be. Measure heart rate, skin colour and sweatiness before and after each activity. Record observations in a table. Discuss findings and compare them to our predictions before children write a conclusion. **Plan, Do, Review – Ask q's and plan an enquiry, observe, measure and evaluate.** **Some misconceptions to be aware of:** Some children may think: • certain whole food groups like fats are 'bad' for you • certain specific foods, like cheese are also 'bad' for you • diet and fruit drinks are 'good' for you	1. Initial assessment of prior knowledge. 2. To recognise and explain that you need light to see things and that dark is the absence of light. Explore light sources. Explore the question 'What is dark? Discuss the idea that we cannot see in complete darkness. 3. To understand that light from the sun can be dangerous and suggest ways to stay safe in the sun. Discuss UV light. Explain what it is and its effects of 'Seeing' UV Light. Know the importance of keeping our eyes safe. Emphasise the importance of never looking directly at the sun, or other bright lights. Design eye protection and explain the 'why'. 4. To recognise that light is reflected from surfaces by investigating the most reflective material. Children make a prediction based on their everyday experiences. Children test the reflectivity of different materials and put the materials in order from most reflective to least reflective. 5. To know mirrors change the direction of light and to explain how mirrors work. Children recap knowledge on reflection and then explore the effect of mirrors. Children explain their understanding of how mirrors work. 6. To recognise that shadows are formed when the light from a light source is blocked by a solid object Explain and discuss opaque, translucent and transparent objects. Explain how opaque objects block light, creating shadows. Children should decide which material would make the best **day curtain** and explain why based on their findings. Making Shadows **Do - Record** 7. To find patterns when investigating how shadows change size. Link back to previous lessons and how shadows are formed. Plan an investigation to answer the	1. Initial assessment of prior knowledge. 2. To explore what forces are and notice that some forces need contact between two objects. Discuss the question: What is a force? Look at different images: Which of these pictures are showing pushes and which are showing pulls? Which two things are touching in each picture to create a movement? Children record their understanding in a diagram. 3. To compare how things move on different surfaces. What is a force meter? Cars down ramps - **DO - record and measure** 4. To explore how magnetic forces work. Discuss how not all forces need contact between two objects to create movement. Show children a magnet. Why do magnets have two different ends? Explain what the north and south poles on a magnet are. Will they pull together (attract), or will they push away from each other (repel)? Children make predictions about what they think will happen. Provide children with a variety of magnets of different sizes, shapes and strengths. Give children some time to investigate what happens when they are put next to each other. Children record what happened to three different examples by drawing a diagram of the two magnets and drawing arrows to show whether they were attracted or repelled. 5. To be able to identify magnetic materials. Recap prior learning. Which of these pairs of magnets will attract and which will repel? Children make their predictions. We know that magnets can attract or repel each other but https://pstt.org.uk/download/2112/?tmstv=1676904277 can other materials be attracted to magnets? Which of these materials do you think are magnetic? Show children the pictures and as a class tick whether or not they predict they will be magnetic. Children test different materials to see if they	1. Initial assessment of prior knowledge. 2. Explore and dissect a range of flowers; identify and describe the functions of different parts of flowering plants by labelling the parts of a plant. Loose observation of plants **Do - Observe** 3. To name the parts of a flower and explain their role in a plant's life cycle. 4. Measuring Plants example https://pstt.org.uk/download/2106/?tmstv=1676904128 - Group work – Think about and discuss what plants need to grow. Discuss different investigations and in groups decide which investigation could be carried out. After deciding on the investigations children make predictions about what they think will happen. 5. Discuss children's observations. What has happened to each plant? Is there a pattern? Remind children of their original questions. Introduce the term – conclusion. Model a written conclusion over a set of results. Children then complete their conclusions. 6. Function of the stem **Review – Evaluate** : 1 – roots absorb water from the soil. 2 – stem transports water to the leaves (sucked up like a straw). 3 – water evaporates from the leaves. 4 – this causes more water to be collected by the roots. Children to record diagrams of water transportation in plants. 7. Seed dispersal Observe flowers being visited by pollinators e.g. bees and butterflies. Observe seeds being blown from the trees e.g. sycamore seeds. Research different types of seed dispersal. Children to create an explanation poster for seeds explaining dispersal & pollination. **Some misconceptions to be aware of:** Some children may think: • plants eat food • food comes from the soil via the	1. Initial assessment of prior knowledge. 2. To compare and group different kinds of rocks based on their appearance. Explore different rocks and discuss the similarities and differences. Investigate the properties of different rocks by researching using secondary sources. Children group and sort rocks into natural or human-made; then group rocks further by the natural or human-made. type of natural rock they are. 3. Explore and investigate different rocks by their properties. Rock Reports **Review – Interpret & Report** 4. To explain how soil is formed and investigate/compare soil samples from Lancaster, Morecambe, Blackpool & London. 5. To explain what a fossil is and how fossils are formed. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Explore the process of fossilisation and be able to explain the process through writing a description or ordering images. 6. To identify changes related to simple scientific ideas in the context of theories about fossils linking to the contributions and findings of Mary Anning. Children explore who Mary Anning was and what a paleontologist is through research and video links. Children understand and explore how her findings have helped improve our understanding, **Some misconceptions to be aware of:** Some children may think: • rocks are all hard in nature • rock-like, man-made substances such as concrete or

			question 'How Do Shadows Change When the Distance Between the Light Source and the Object Changes?' Encourage children to look at their results to try to find a pattern. They should also look for any results that do not fit the pattern and try to suggest a reason for them. Children complete their results to explain the pattern and evaluate their findings. **Do & Review -Record, interpret, evaluate.** Some misconceptions to be aware of: Some children may think: • we can still see even where there is an absence of any light • our eyes 'get used to' the dark • the moon and reflective surfaces are light sources • a transparent object is a light source • shadows contain details of the object, such as facial features on their own shadow • shadows result from objects giving off darkness	are magnetic by using a magnet against the material to see if there is a force (either attraction or repulsion. Children test materials in the classroom and record their findings. 6. Explore the strength of different magnets. Magnet Tests **– Plan & DO – Ask Q's, plan & set up an enquiry** https://pstt.org.uk/download/2096/?tmstv=1676903803 Some misconceptions to be aware of: Some children may think: • the bigger the magnet the stronger it is • all metals are magnetic.	roots • flowers are merely decorative rather than a vital part of the life cycle in reproduction • plants only need sunlight to keep them warm • roots suck in water which is then sucked up the stem.	brick are rocks • materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer 'natural' • certain found artefacts, like old bits of pottery or coins, are fossils • a fossil is an actual piece of the extinct animal or plant • soil and compost are the same thing.
Assessment task/evidence	*Label the skeleton of another animal e.g. dog. Explain similarities and differences between the skeleton they have chosen and the human skeleton. Describe how joints and muscles help them move.*	*• Plan a daily diet to contain a good balance of nutrients and an exercise programme for a particular type of person e.g. an athlete/elderly person recovering.*	*• Write a guide for Mrs. Bramhall to set up a shadow theatre in Apple class explaining how light works and shadows are formed.*	*Create an explanation poster on magnets – what would be a good use for them? E.g. recycling metals, furniture safety catches for toddlers etc.*	Create a new species of flowering plant. Draw and label a diagram of their created flowering plant to show its parts, their role and the method of pollination and seed dispersal Water Colours	Children select own way to share their knowledge of rocks, soils and fossils e.g. double page spread, poster, PPT, comic strip or non-chronological report.

Year 4 – Eucalyptus Class

Term	Autumn 1	Autumn 2	Spring	Summer 1	Summer 2
Unit	**Animals including Humans**	**States of Matter**	**Electricity**	**Sound**	**Living things and Their habitats**
Intent	In this topic pupils will be introduced to the main body parts associated with the digestive system: mouth, tongue, teeth, oesophagus, stomach and small and large intestine and conduct scientific research using secondary sources to help them to understand their special functions. They will learn about the different types of teeth that humans have, their position in the mouth and function, and compare the teeth of carnivores and herbivores to suggest reasons for their differences. Children will construct and interpret a range of different food chains, identifying the main stages – sun, producer (plant), consumer (primary, secondary, tertiary), prey and predator.	In this unit children will explore a variety of everyday materials and develop simple descriptions of the states of matter. They will learn about the properties of different materials and how they can be grouped and classified. They will observe water as a solid, a liquid and a gas and will learn about the changes to water when it is heated or cooled. They will learn about the different stages of the water cycle and the processes involved in the continuous changes of state.	In this unit on 'Electricity', children will learn about the key components of a simple circuit, such as a bulb, buzzer, motor, cell or battery. They will find out about the purpose of a switch and make associations with circuit outputs. They will explore how to construct different simple series circuits, trying different components, and use their circuits to create simple devices. They will draw electrical circuits as a pictorial representation and begin to learn about conventional circuit symbols. They will learn about insulators and conductors and will carry out investigations into their properties. They will also learn about precautions for working safely with electricity.	In this unit the children will learn that sound produces vibrations which travel through a medium from the source to our ears. That different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound. They will learn that the loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. They will learn that a sound insulator is a material which blocks sound effectively. To understand and make links to learning in music that pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.	In this unit the children will learn that living things can be grouped (classified) in different ways according to their features. They will use classification keys to identify and name living things. They will revisit prior learning from year 2 knowing that living things live in a habitat which provides an environment to which they are suited. They will understand that these environments may change naturally e.g. through flooding, fire, earthquakes etc. and that humans also cause the environment to change in positive and negative ways. They will also know that these environments change with the seasons; that different living things can be found in a habitat at different times of the year.
Key Knowledge	• To know and describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and know their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey	• compare and group materials together, understanding whether they are solids, liquids or gases • observe and understand 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 and understand the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	• know and 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 • show understanding of circuits by identifying 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 • know that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise and understand some common conductors and insulators, and associate metals with being good conductors	• identify and know how sounds are made, associating some of them with something vibrating • recognise and understand 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 and understand patterns between the volume of a sound and the strength of the vibrations that produced it • recognise and understand that sounds get fainter as the distance from the sound source increases	• recognise that living things can be grouped in a variety of ways • explore and use and understand classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise and understand that environments can change and that this can sometimes pose dangers to living things
Key Skills	**Asking questions and recognising that they can be answered in different ways.** • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. **Answering questions and concluding** **Using straightforward scientific evidence to answer questions or to support their findings.**	**Making observations and taking measurements** *Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers.* • The children make systematic and careful observations. • They use a range of equipment for measuring time and temperature. They use standard units for their measurements. **Engaging in practical enquiry to answer questions**. *Setting up simple practical enquiries, comparative and*	**Recording and presenting evidence** • Recording findings using simple scientific language, drawings, labelled diagrams and keys • The children sometimes decide how to record and present evidence. They record their observation e.g. using ,labelled diagrams or writing. • Children are supported to present the same data in different ways in order to help with answering the question. (switch/batteries) **Answering questions and concluding** • Identifying differences, similarities or	**Recording and presenting evidence** • Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. • The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. • They record their measurements e.g. using tables and bar charts (given templates, if required, to	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions** • They record classifications e.g. using tables, Venn diagrams, Carroll diagrams. **Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions**

	• Children answer their own and others' questions based on information they have gained from secondary sources. The answers are consistent with the evidence. **Identifying differences, similarities or changes related to simple scientific ideas and processes.** • Children begin to identify naturally occurring patterns and causal relationships.	*fair tests* • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking.	changes related to simple scientific ideas and processes. • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify causal relationships. **Evaluating and raising further questions and predictions** • They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry	which they can add headings). • Children are supported to present the same data in different ways in order to help with answering the question. **Engaging in practical enquiry to answer questions** Setting up simple practical enquiries, comparative and fair tests • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests and pattern seeking. **Answering questions and concluding** • Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • They draw conclusions based on their evidence and current subject knowledge.	• Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry. (global support for wildlife) **Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions** • They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary. **Evaluating and raising further questions and predictions** • Using results to draw simple conclusions and raise further questions
Key Vocabulary	human digestive system: digestion, mouth, tongue, teeth, saliva, oesophagus, transports, stomach, acid, enzymes, small intestine nutrients, vitamins, large intestine, colon, rectum, anus teeth: incisors – cutting, slicing, canines – ripping, tearing, pre-molars, molars – chewing, grinding, floss, brush, food chain, sun, producers, prey, predators, carnivore, herbivore, omnivore	Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle	electricity, electrical appliance/device, mains, plug, electrical circuit, component, cell, battery, positive, negative, connect, connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol	Sound, source**,** vibrate, vibration, vibrating, vibrate, travel, pitch (high/low), volume, faint, loud, insulation	Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate
Prior Learning	• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - 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. (Y3 - Animals, including humans)	• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	• Explore how things work. (Nursery - Electricity)	• Explore how things work. (Nursery – Sound) • Describe what they see, hear and feel whilst outside. (Reception –Sound) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 Animals, including humans)	• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans) • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things **and their habitats)**

Future Learning	• Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. (Y6 -Animals, including humans) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their body's function. (Y6 - Animals, including humans) • Describe the ways in which nutrients and water are transported within animals, including humans. (Y6 - Animals, including humans)	• Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials) • Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials) • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 -Properties and changes of materials) • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials) • Demonstrate that dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials) • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. (Y5 - Properties and changes of materials)	• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. (Y6 - Electricity) • 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. (Y6 - Electricity) • Use recognised symbols when representing a simple circuit in a diagram. (Y6 - Electricity)	Endpoint in Y4 KS2 future learning is KS3	• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - 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. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)
Suggested sequence of lessons	1. Initial assessment of prior knowledge 2. Introduce the word 'digest' (to break down food so that it can be used by the body) and 'digestive system' (a system of organs that transports food in and out of the body and which makes use of the food to keep the body healthy) Research the parts of the digestive system - write/draw the journey of a chicken nugget as it travels through the digestive system. 3. Digestion Model **Review – Interpret & Report** Recap prior learning and label the parts of the digestive system. Research the functions and processes of the parts of the digestive system and present your findings by adding information to the diagram. 4. To identify the different types and functions of teeth Look at a model of human teeth and identify the different teeth – incisors (bite and cut food), canine (tear and rip food), premolars (hold and crush food), molars (grind food) and wisdom teeth (no function anymore). Children label diagrams of the teeth with names, shape and function and colour code to identify the different types. Explore how animals have different or similar teeth depending on their diet (carnivore, omnivore, herbivore. 5. Teeth (eggs) in Liquids **Review – Evaluate** 6. Explore the meaning of a 'food chain' using images of examples. Use food chains to identify producers, predators and prey within a habitat. Emphasise that all food chains start with the sun because plants need light to make food. The	1. Initial assessment of prior knowledge 2. To compare, sort and group materials as solids, liquids and gases and recognise their different properties. Children reinforce their understanding with diagrams of particles for solids, liquids and gases, and sort properties for each. 3. To investigate gases and explain their properties. Explore a clear bottle of fizzy drink and identify the materials and examples of the 3 states – solid, liquid and gas. Discuss whether gases weigh anything when they are invisible. Investigate the weight of gas in different drinks and draw conclusions. 4. To explore how water changes its state from a solid, to liquid to gas. Explore the properties of Three States of Water. Discuss what makes materials, like water, change state from a solid, to liquid, to gas and back again using water, ice and water vapour to illustrate. Discuss the processes involved in the changes of state using a diagram (meting, freezing, condensing, evaporating, cooling). Identify what happens to the particles during the changing state. For example, when a liquid changes to a solid (freezing) the particles in a liquid are free to move quickly but when cooled they slow down to vibrate and form a solid structure (frozen). 5. To observe and investigate materials as they change state when heated and cooled. Investigate the melting point of different materials (e.g. wax, chocolate, ice-cream, butter, icecube) using a candlelight and stand. Children make predictions about what they think will happen and draw conclusions after observing and heating. Measure melting point with a thermometer and read scales accurately in degrees centigrade. Consider each material and discuss their observations of what happened when it was heated. Discuss whether the materials can be returned to their original state by cooling (solidifying) and explore how this might	1. Initial assessment of prior knowledge 2. To know how electricity is generated and identify appliances that are powered by it. 3. To recognise the importance of safety when using electricity and know the dangers. Revisit the range of appliances that are powered by mains electricity and batteries and identify why each form of power may be used, such as convenience, amount of power needed. Learn about the importance of working safely with electricity (mains) and what the dangers are. Children create a poster for using electricity safely e.g. Don't overload a socket. 4. To construct a simple series circuit and identify the name and purpose of different components. Learn about 'electrical circuits' and explore examples of circuits that are complete and incomplete, and the reasons why, e.g. no power source. Know that a circuit must be complete (full loop) in order to work and must include a cell/battery, wires and a range of components (light bulb, buzzer, motor, switch). Explore different components within a circuit and identify their function by making different circuits. Children should be introduced to one component at a time and its symbol. Learn how electrical current flows from the power source, along the wires, and through the pathway of the components to power them. Learn that electricity is the flow of electrical charge through materials from the positive to the negative end of the supply. Practise making different circuits and exploring the function of different components, such as	1. Pre unit quiz to assess prior knowledge and classification of sound sources. 2. To describe how sounds are made by vibrations by exploring making sounds with various objects including musical instruments and household objects. Draw a scientific diagram explain how sound is made. 3. Through the exploration of string telephones understand how sound travels through a medium to the ear. Draw a diagram to explain how they work and suggest improvements to their designs. https://pstt.org.uk/download/2172/?tmstv=1676905718 4. Investigating Pitch **Asking Q's, Plan and set up an enquiry** 5. By conducting experiments know and understand that sounds get fainter as the distance from the sound increases using the data collected to find patterns and evidence their findings. **Some misconceptions to be aware of:** **Pitch and volume are frequently confused, as both can be described as high or low.** **Some children may think:** **• sound is only heard by the listener** **• sound only travels in one direction from the source** **• sound can't travel through solids and liquids** **• high sounds are load and low sounds are quiet.**	1. Pre unit quiz to assess prior knowledge and knowledge of the unit. Identify a variety of habitats and explore why organisms live in different habitats. Explore children's understanding of a 'habitat' (forest) and 'micro-habitat' (rock-pool) and learn how the physical features, food source and climate needs to meet the environmental conditions required for each organism to survive. Look at a range of different habitats. Identify the conditions of given habitats and how animals are suited to these habitats. Groups investigate and present their habitat and matching organisms explaining what they have found out. 2. To group and classify living organisms using their characteristics and features. Give children a wide range of living organisms and challenge them to sort them and explain their reasons why (common characteristics) – use a Venn diagram with a range of categories and investigate how this changes the sorting of organisms, e.g. animal/plant. Repeat the sorting activity of organisms in groups using a Carrol diagram and explore using different criteria. Discuss which grouping technique they think was best and why? 3. To classify animals into specific groups according to their characteristics (vertebrates) Explore 'classification' What is classification? Discuss how scientists organise new species based on their similarities and differences – variation. Identify that plants and animals are 2 groups but have

	arrows show the transfer of energy and go in the direction of the consumer. Classify herbivore, carnivore and omnivore. 7. Use secondary sources to identify animals in a habitat and find out what they eat. **What do they notice about animals in the same habitat?** **Some misconceptions to be aware of:** **Some children may think:** **• arrows in a food chain mean 'eats'** **• the death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain** **• there is always plenty of food for wild animals** **• your stomach is where your belly button is** **• food is digested only in the stomach** **• when you have a meal, your food goes down one tube and your drink down another** **• the food you eat becomes "poo" and the drink becomes "wee".**	change the material (e.g. shape). Draw conclusions about materials having different melting points. 6. To understand that droplets of condensation are formed from water vapour are the reverse process of evaporation. Explore examples of condensation. Discuss the droplets or mist observed – water vapour. Explain that this is a process called condensation when a gas turns into a liquid because it has been cooled down. Reinforce condensation as the opposite of evaporation. Children observe ice cubes placed in a jam jar and discuss what happens. Establish that water droplets begin to form on the outside of the jar when water vapour in the air hits the cold glass and turns from a gas into a liquid – they condense. Children make labelled diagrams to show their understanding and use the words gas, liquid, evaporate and condensation. 7. Cornflour slime **Plan – Ask Q's and plan an enquiry** 8. To identify and explain the different stages of the water cycle. Show them an animated video of the water cycle/conduct secondary research and discuss the different stages of a rain droplet as it changes from a gas to a liquid to a solid and back again. Explain the different stages –. Children draw and label a water cycle diagram, including the key vocabulary. **Some misconceptions to be aware of:** **Some children may think:** **• 'solid' is another word for hard or opaque** **• solids are hard and cannot break or change shape easily and are often in one piece** **• substances made of very small particles like sugar or sand cannot be solids** **• particles in liquids are further apart than in solids and they take up more space** **• when air is pumped into balloons, they become lighter** **• water in different forms – steam, water, ice – are all different substances** **• all liquids boil at the same temperature as water (100 degrees)** **• melting, as a change of state, is the same as dissolving** **• steam is visible water vapour (only the condensing water droplets can be seen)** **• clouds are made of water vapour or steam** **• the substance on windows etc. is condensation rather than water** **• the changing states of water (illustrated by the water cycle) are irreversible** **• evaporating or boiling water makes it vanish** **• evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material.**	how to light a bulb in a simple series circuit. 5. To investigate faulty circuits as a 'circuit detective' and explain how they can be fixed. Explore how to construct a full circuit that will power different components, such as a light bulb, and explain what the output is. Children experiment with different components to complete a set of instructions and build circuits, such as power a motor or increase the speed of a motor (add an extra battery). Test their ideas by building circuits and explain why they think they work or do not work. Drawing circuit diagrams for each circuit and explaining what components were needed and what the output using universal symbols for each component. Explore different circuit diagrams that contain a fault. Learn how to test the circuits, recognise what the fault is and explain how it can be fixed – draw the correct circuit diagram and explain how they fixed the original circuit. 6. To investigate materials that are good electrical conductors and insulators. Electrical Conductors **Review – Interpret & Report** 7. To investigate the function of a switch in a circuit and explain why they are needed. Identify the purpose of switches in everyday life, such as turning lights on or off. Learn that they provide control in a circuit to stop the flow of electricity (turn a light off) or turn it on (switch a light on). Explore placing a switch in a circuit and find out how it 'breaks' a full circuit to stop the flow of electrons (open switch) or completes a circuit (closed switch). Investigate whether the position of the switch matters. Draw conclusions from the results. **Some misconceptions to be aware of:** **Some children may think:** **• electricity flows to bulbs, not through them** **• electricity flows out of both ends of a battery** **• electricity works by simply coming out of one end of a battery into the component.**		enormous variation within these large classification groups. Which 2 groups are animals organised into? Explore the subgroups of vertebrates (backbones) What is are vertebrates and invertebrates (no backbone). Children learn about the characteristics of the 5 main vertebrate groups and sort the features under headings – mammals, birds, amphibians, reptiles and fish. Challenge them to sort given animals under each heading and discuss their similarities/differences. Introduce the idea of classification keys as a way of sorting animals into groups through a series of 'yes or no' questions, according to specific criteria. Children generate questions to sort vertebrates using a simple branching key. 4. Local Environment Survey **Do – Record** 5&6: To recognise positive and negative changes to the local environment. Recap on the idea that a habitat is a place where animals and plants live, where they can find everything they need to stay alive 7. Life processes. Discussing their own habitat and changes that humans exert on the environment. Learn that plants/animals are unable to make big changes to their environment - vulnerable to changes in their habitat. Children list threats to local habitats that they see in the images, e.g. litter, river pollution, forest fires, deforestation, building roads, removing greenbelts. Carry out a 'local habitat survey' -school grounds/Williamson's Park that show signs of man-made changes. Identify, draw, label, write written explanation of man-made dangers to living things Identify the 'environmental dangers', what changes have occurred, what the dangers are to living things and what action can be taken to protect them. Discuss positive ways children can impact on the local environment (e.g. grow a wild garden, build bug homes). Share plans for helping the local habitat and the wildlife that lives there.
Assessment task/evidence	What if activity……what if we didn't have a mouth/anus/teeth?	What's going on – Liquid of life (Explorify) Children explain what is happening.	What is this? – label a circuit and explain how it work Application of knowledge in the DT projects making games.	Bottle orchestra	To write an explanation text on classification keys and use either a vertebrates or invertebrate example to show their knowledge and understanding. Furry Flyers

Year 5 - Willow Class

Term	Autumn 1	Autumn 2	Spring	Summer 1	Summer 2
Unit	**Forces**	**Earth & Space**	**Properties & Changes of Materials**	**Living Things & Their Habitats**	**Animals Including Humans**
Intent	In this topic on 'Forces', the children will find out how scientists, such, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. They will experience forces that make things begin to move, get faster or slow down. The children will explore the effects of friction on movement and investigate air and water resistance and learn about the effects of levers, pulleys and simple machines on movement. They will focus on carrying out investigations to observe, measure and record accurately, creating their own recording tables and evaluate the data they collect.	In this unit the children will learn that the Sun is a star. It is at the centre of our solar system. There are 8 planets. These planets travel around the Sun in fixed orbits. Earth takes 365¼ days to complete its orbit around the Sun. That the Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical. They will research how ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus. They will carry out research on planets in the solar system and other stars in our constellation.	In this unit, the children will build upon their knowledge of materials, understanding that materials have different uses depending on their properties and state (liquid, solid, gas). They will learn to describe material properties for their electrical and thermal conductivity in addition to attraction to magnets. They will explore and investigate learning that some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. They will learn that mixtures can be separated by filtering, sieving and evaporation. They will understand that some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials, and these are not reversible. Throughout this unit the children will focus on their investigating, measuring and recording skills. They will focus on the accuracy of their measurements and decide when to retest in order to ensure data is reliable. They will record using line graphs and interpret the data they collect.	In preparation for this unit the children will have planted lily bulbs and strawberry plants in February. The children will build upon prior knowledge of plants to investigate and learn about sexual and asexual reproduction in plants. They will also develop their own simple classification keys to sort animals. They will conduct their own research to find out about the life cycles of a range of animals and choose how to present the information they gather. In this unit they will focus on observing over time and using secondary sources to find out key information.	In this unit the children will focus on **biological changes** in human development from birth to old age. This unit will be taught in conjunction with our HRSE policy using Ten:Ten resources as agreed by all school stakeholders (Autumn Term).
Key Knowledge	• 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	• describe the movement of the Earth, and other planets, relative to the Sun • 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	• compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • 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, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • 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, including changes associated with burning and the action of acid on bicarbonate of soda	• 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	• describe the changes as humans develop to old age
Key Skills	**Asking questions and recognising that they can be answered in different ways** • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. **Making observations and taking measurements** • Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when	**Asking questions and recognising that they can be answered in different ways** • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. • They choose a type of enquiry to carry out and justify their choice. • They recognise how secondary sources can be used to answer questions that cannot be answered	**Making observations and taking measurements** • Taking measurements, using a range of scientific equipment, with **increasing accuracy and precision**, taking **repeat readings** when appropriate • During an enquiry, **they make decisions** e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value). **Engaging in practical enquiry to answer questions** • The children select from a range of practical resources to gather evidence to answer their questions. • They carry out fair tests, **recognising and controlling variables.**	**Asking questions and recognising that they can be answered in different ways** • They recognise **how** secondary sources can be used to answer questions that cannot be answered through practical work. **Recording and presenting Evidence**	**Asking questions and recognising that they can be answered in different ways** • **Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary**. • Children **independently** ask scientific questions. This may be stimulated by a scientific experience or involve asking

	appropriate **Recording & Presenting Evidence** • The children decide how to record and present evidence. • They record observations, e.g. using labelled diagrams. • They record measurements e.g. using tables, bar charts and line graphs. **Evaluating & Raising Further questions** • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements**.**	through practical work. **Recording & Presenting Evidence** • **Children present** the same data in different ways in order to help with answering the question. **Answering Questions & Concluding** • Identifying scientific evidence that has been used to support or refute ideas or arguments. • They talk about how new discoveries change scientific understanding. **Evaluating & Raising Further questions** • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of in oral and written forms such as displays and other presentations. • They evaluate the credibility of secondary sources used.	• **They decide what observations or measurements to make over time and for how long.** • **They look for patterns and relationships using a suitable sample.** **Recording and presenting Evidence** • **Recording data and results of increasing complexity using scientific diagrams and labels, tables, scatter graph and line graphs** • They record observations e.g. using **annotated photographs**, **labelled scientific diagrams** or writing. • They record measurements e.g. using tables **and line graphs.**	• They record observations e.g. using **annotated photographs**, videos, labelled diagrams, **observational drawings**, **labelled scientific diagrams** or writing. • They record classifications e.g. using tables, Venn diagrams, Carroll diagrams **and classification keys**. **Answering questions and concluding** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources.	further questions based on their developed understanding following an enquiry. • Given a **wide** range of resources the **children decide for themselves how to gather evidence to answer a scientific question.** • They **choose a type of enquiry to carry out and justify their choice**. **Making observations and taking measurements** • During an enquiry, **they make decisions** e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value). • During an enquiry children will make decisions about collecting accurate data using more **complex mathematical skills** e.g. averages - mean, median & mode. **Recording and presenting Evidence** • They record measurements e.g. using tables, tally charts, bar charts**, line graphs and scatter graphs**.
Key Vocabulary	force, gravity, Earth, air, resistance, friction, mechanisms, simple, machines, levers, pulleys, gears	Earth, Sun, Moon, moons, planets, stars, solar system, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, spherical, solar system, rotates, star, orbit	Thermal, electrical, insulator, conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material	life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings	puberty, life cycle, gestation, growth, reproduce, foetus, baby, fertilisation, toddler, child, teenager, adult, old age, life expectancy, adolescence, adulthood, early adulthood, middle adulthood, late adulthood, childhood **Girl's Puberty:** Larynx grows, underarm hair, menstruation pubic hair, breasts **Boy's Puberty**: larynx grows (Adam's apple), chest hair, pubic hair, scrotum, testes, penis, facial hair, underarm hair **Both** Sweat glands Body growth
Previous Learning	• Compare how things move on different surfaces. (Y3 - Forces and magnets) • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets) • Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets) • Compare and group together a variety of everyday materials on the basis of	• Explore the natural world around them. (Reception – Earth and space) • Describe what they see, hear and feel whilst outside. (Reception – Earth and space) • To know the names of the planets in our solar system, the Sun and the moon (Reception – Earth and space) • Observe changes across the four seasons. (Y1 - Seasonal changes) • Observe and describe weather associated with the seasons and how	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) • 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. (Y3 - Forces and magnets) • Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter)	• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)	• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)

	whether they are attracted to a magnet and identify some magnetic materials. (Y3 - Forces and magnets) • Describe magnets as having two poles. (Y3 - Forces and magnets) • Predict whether two magnets will attract or repel each other depending on which poles are facing. (Y3 - Forces and magnets)	day length varies. (Y1 - Seasonal changes)	• 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). (Y4 - States of matter) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)		
Future Learning	**KS2 End point, future learning Key Stage 3**	**KS2 End point, future learning Key Stage 3**	**KS2 End point, future learning Key Stage 3**	**KS2 End point, future learning Key Stage 3**	**KS2 End point, future learning Key Stage 3**
Suggested Sequence of Lessons	1. A. Initial assessment of prior learning B. To identify different forces and how they affect objects around us. 2. To explore the effect that gravity has on objects and how the theory of gravity was developed. Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. 3. To investigate the effects of air resistance **Do: Observe & measure Spinners** 4. To identify the effects of upthrust and water resistance **Review: Interpret, Report, Evaluate – Aquadynamics** 5. To investigate the effects of friction on objects. 6. To explore different types of mechanisms used in everyday life, such as a seesaw (lever), watch (gears, cranes (gears/pulleys), raising a flag (pulley) and identify how mechanisms (such as levers, gears and pulleys) help to lift the mass of heavy objects by impacting on the force acting on an object. Learn that such mechanisms are designed to make work easier. Investigate how pulleys transfer force and motion. **Do: Observe and Measure Titanic Pulleys** **Some misconceptions to be aware of:** **Some children may think:** × the heavier the object the faster it falls, because it has more gravity acting on it × forces always act in pairs which are equal and opposite × smooth surfaces have no friction × objects always travel better on smooth surfaces × a moving object has a force which is pushing it forwards and it stops when the pushing force wears out × a non-moving object has no forces acting on it × heavy objects sink and light objects float.	1. A. Initial assessment of prior learning B. **Plan: Ask Qs and plan an Enquiry Space Travel Qs** 2. To describe the relative size and shape of the Sun, Earth and Moon linked to scientific evidence. Explore objects to represent their relative size, e.g. beach ball (Sun), blueberry (Earth) and poppy seed (Moon) and find out about their mathematical size and comparisons (1 million Earths = 1 sun and 49 Moons = 1 Earth). Create a distance scale and measure their relative position in the solar system. 3/4 To describe the movement of the Earth, Moon and other planets, relative to the Sun, in the solar system. Creates posters, labelled diagrams, information leaflets or 3D models about the planets in the solar system. **Review: Interpret & Report Solar System Research** 5. To research and explore the difference between 'rotate' and 'orbit' and learn about scientific evidence that helps us to understand how the planets move in the solar system. Learn about Ptolemy's 'Geocentric' theory and compare to Copernicus's 'Heliocentric' theory of the solar system. Explore the different scientific models of the solar system, evidence that supports them, and learn how and why scientific ideas have changed over time. 6. To explain what causes day and night and the apparent movement of the sun across the sky. 7. To explain the movement of the moon relative to the Earth and the moon's phases **Some misconceptions to be aware of:** **Some children may think:** × the Earth is flat the Sun is a planet × the Sun rotates around the Earth × the Sun moves across the sky during the day	1. A. Initial assessment of prior learning B. To compare materials according to their different properties. Explore different materials and group by simple properties, such as natural, synthetic and those altered by heat or chemicals. Identify different types of properties and match with their definitions, such as flammable, permeable, flexible, magnetic, translucent. Test the different properties of materials and sort into groups, e.g. magnetism, hardness, permeability, translucency, conductivity. Record results and draw conclusions, linking how materials are suited to different purposes, e.g. glass for a window. Research different examples around the school environment and how the materials chosen are suited to their purpose - present to the class. 2. To investigate and give reasons for how materials are suited to their purpose Explore an everyday object (e.g. bicycle) and identify the different materials used for each part and why they were chosen for their use – link them to their purpose, e.g. rubber tyres to create friction and prevent skidding. Research how each material was made (natural, synthetic or chemical/heated process to make a new material). 3. Carry out an investigation to explore how materials are chosen to suit their purpose, e.g. Which material would be most effective for stopping an ice-cube melting? (thermal insulator/conductor) What would be the best material to keep hot drinks warm? (thermal insulator/conductor). Children plan and carry out investigations and draw conclusions. 4. To recognise processes involved in reversible changes in materials. Explore the different states of matter of water as a solid, liquid and gas (flow diagram). Identify the processes involved in changing state and what happens to the material's particles. Identify water as an example of a 'reversible' change. Use a carousel of activities to observe a range of reversible changes. Children record observations and identify the processes involved and how they can be reversed, e.g. evaporation, condensation, melting, dissolving, boiling, freezing, cooling. 5. To investigate how different materials dissolve at different rates; understanding that some materials are soluble, and others insoluble (they leave a sediment/suspension) Children recognise this as an example of a new material. Explore what happens when a solution is 'saturated'. Discuss how this change can be reversed (evaporation/heating). **Plan: Ask Q's & plan an enquiry - Dissolving** Present data on a line graph and draw conclusions 6. **To understand different processes used to separate a mixture of materials** (BBC Bitesize Clip) Introduce a scenario where a supermarket delivery truck has had a disaster and many products have become mixed up and need separating. The manager has asked for some help. 1) bottle water has mixed with a bag of play sand 2) a bag of salt has mixed with bottles of water 3) flour has mixed with a bag of raisins 4) a box of paper clips has mixed with a bag of rice. Discuss each of the pairs of materials and their state of matter, e.g. water/sand = liquid and solid (suspension not dissolved). Children explore the different mixtures and label the 2 material states and consider separating methods. Introduce 4 different separation processes (evaporation, magnetic attraction, filtration and sieving) and explore how they work. Children match the mixture to the correct	1. A. Initial assessment of prior learning B. To explain the function of different parts of a flower. Recap prior learning inY3. Discuss why some plants are flowering (pollination for reproduction) and some are non-flowering (dispersion) and how this impacts on their life cycle. Discuss how all living things need to reproduce to create new living things. Learn how there are 2 types – sexual reproduction and asexual reproduction. Children use digital microscopes to explore parts of a flowering part and label the different parts involved in fertilisation and their function, e.g. stem, sepal, petal, stamen (male part that contains the anther and filament), pistil (female part that contains stigma, style, and ovary. Children dissect a flower and explore the female and male parts. 2. To describe the processes of asexual reproduction in flowering plants (strawberries) 3. To describe the process of asexual reproduction in plants/To investigate the process of asexual reproduction in plants 4. To classify animals and identify their key features. Explore different images of animals and discuss how they are similar to plants – they all need the 7 life processes to survive. Compare with plants, e.g. both grow in size. Discuss how animals can be grouped or classified – like plants. What is similar and what is different? Challenge children to group them and explain their reasons.	1. To identify and describe the key stages of human development. BBC Video 2 & 3 To know about the main changes that take place in puberty in males and females 4. To identify the changes that take place in old age. **5 Do: Observe and Measure Human Growth Survey** 6. To investigate the different gestation period of animals, compared to humans Video link. **Some misconceptions to be aware of:** **Some children may think:** × a baby grows in a mother's tummy × a baby is "made".

		× the Sun rises in the morning and sets in the evening × the Moon appears only at night × night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.	separation process and explain why they have chosen it. For each mixture, explain which process they would use and why. Draw a labelled diagram to illustrate their observations. Finally, the manager finds one more mixture of sand, salt and water and needs help separating the 3 materials. Children explain their choices of methods to solve the problem using knowledge of materials and their properties. 7. **To identify and explain irreversible chemical changes** (BBC Bitesize Clip) Discuss the changes and identify the reactant (material you start with) and the product (new material) of the chemical change (heat), e.g. heat + egg = fried egg. Discuss whether these can be reversed as before and recognise these as 'irreversible changes' caused by a chemical change. A raw egg once heated and changed to a cooked egg (chemical reaction) cannot be changed back as a new product has been produced. 8. To investigate irreversible changes. Children identify the reactant, chemical change and new product, e.g. sand + water + heat = glass. Carry out a carousel of irreversible change activities for the children to explore: 1) mixing milk and vinegar (milk plastic) 2) mixing bicarbonate of soda and vinegar 3) mixing water and plaster of Paris 4) mixing borax powder, water and PVA. Children record their observation and draw diagrams to explain what they have seen. Draw conclusions about irreversible changes and recognise they don't always create useful new materials. 9. To investigate the effect of burning on different materials. Teacher models burning a wooden taper by rubbing the wood along the matchbox. Repeat with the match and explain that the match contains phosphorous (flammable) and the friction of rubbing the match generates enough heat to ignite the chemical. Children observe the burning taper and discuss what happens to the wood. Establish that burning is an irreversible change and often called combustion. When wood burns it turns to ash and mixes with the oxygen in the air to form carbon dioxide. Draw a labelled diagram and explain what they have observed. Investigate (teacher led) burning a range of different materials and record observations of what happens to each material after 'combustion'. Children record using scientific diagrams what they have observed. **Some misconceptions to be aware of:** Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed. **Some children may think:** × thermal insulators keep cold in or out × thermal insulators warm things up × solids dissolved in liquids have vanished and so you cannot get them back × lit candles only melt, which is a reversible change	Children create their own sorting key in groups to reinforce their understanding. 5. To describe the life cycle and sexual reproduction of mammals. 6. To compare different animal life cycles. Children should research the life cycles of the following: a mammal, an amphibian, a an insect and a bird. **Review: Interpret and report – Life Cycles** **Some misconceptions to be aware of:** **Some children may think:** × all plants start out as seeds × all plants have flowers × plants that grow from bulbs do not have seeds × only birds lay eggs.	
Assessment	Explorify • What's going on? Pull down lift up • What if……There was no gravity?	Explorify • What if …. the sun rotated and the earth didn't? • Odd one Out Maps of the solar system	Review, Interpret, Evaluate Forensic Powders	Information leaflet on plant reproduction	Start with ART -Explorify Lifecycle for Rosie using scientific vocabulary.

Year 6 - Sycamore Class

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer
Unit	**Light**	**Electricity**	**Animals including Humans**	**Evolution & Inheritance**	**Living Things & Their Habitats**
Intent	In this topic on 'Light', the children will focus on learning about how light travels in straight lines and how the reflection of light enables us to see objects. They will investigate the law of reflection, using mirrors and explore how shadows change in size, shape and direction depending on the position and distance of the light source.	In this unit the pupils will learn to recognise the universal symbols for electrical components and use them to draw clear and accurate simple circuit diagrams. They will also learn about the effect of cell voltage on circuit components and carry out investigations to explore the impact, e.g. investigating the relationship between wire length and bulb brightness.	In this unit, children will continue to learn about the main body parts and internal organs to explore and answer questions that help them to understand how the circulatory system enables the body to function. They will build upon and develop what the know about to keep their bodies healthy, through a balanced diet and regular exercise, and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body.	In this unit the pupils will find out more about how living things on earth have changed over time and begin to understand the reasons why. They will understand the idea that characteristics are passed from parents to their offspring. They will recognise that living things produce offspring, and that normally these offspring are not identical to their parents - variation. They will also learn that variation in offspring over time can make animals more or less able to survive in particular environments. They will discover how and why animals and plants adapt to suit their environment in different ways – and that adaptation may lead to evolution.	In this unit, pupils will learn that living things can be formally grouped according to characteristics (classification system). Plants and animals are two main groups but there are other livings things that do not fit into these groups. Through observations, children will use the classification system to classify living things. They will learn about the 5 kingdoms and discuss why living things are placed in one group and not an other.
Key Knowledge	• 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	• 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	• 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	• 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	• describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals • give reasons for classifying plants and animals based on specific characteristics
Key Skills	**Asking questions and recognising that they can be answered in different ways** • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. • They choose a type of enquiry to carry out and justify their choice. **Engaging in practical enquiry to answer questions** • The children select from a range of practical resources to gather evidence to answer their questions. • They carry out fair tests, recognising and	**Asking questions and recognising that they can be answered in different ways** • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. • They choose a type of enquiry to carry out and justify their choice. **Answering Questions & Concluding** • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge. **Evaluating: Raising Further Questions and Predictions** • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms. • They evaluate, for example, the choice	**Making observations and taking measurements** • Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • During an enquiry children will make decisions about collecting accurate data using more complex mathematical skills e.g. averages - mean, median & mode. **Engaging in practical enquiry to answer questions** • They decide what observations or measurements to make over time and for how long. • They look for patterns and relationships using a suitable sample. **Evaluating and Raising Further Questions and Predictions** • Using test results to make predictions to set up further comparative and fair tests. • Children use the scientific knowledge	**Asking questions and recognising that they can be answered in different ways** • They recognise how secondary sources can be used to answer questions that cannot be answered through practical work. **Answering Questions & Concluding** • Identifying scientific evidence that has been used to support or refute ideas or arguments. • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence.	**Asking questions and recognising that they can be answered in different ways** • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question**.** **Answering Questions & Concluding** • Identifying scientific evidence that has been used to support or refute ideas or arguments. • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. **Evaluating and Raising Further Questions & Predictions** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used.

	controlling variables. • They decide what measurements to take. • They look for patterns and relationships using a suitable sample.	of method used, the control of variables & the precision and accuracy of measurements. • They identify any limitations that reduce the trust they have in their data.	gained from enquiry work to make predictions they can investigate using comparative and fair tests.		• They identify any limitations that reduce the trust they have in their data.
Key Vocabulary	light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous light, travels, straight lines, light rays	circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage, volt	heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle	offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils	classify, classification, domain, kingdom, phylum, class, order, family, genus, species, characteristics, vertebrates, invertebrates, microorganisms, organism, flowering, non-flowering
Previous Learning	• Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light) • Notice that light is reflected from surfaces. (Y3 - Light) • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light) • Find patterns in the way that the size of shadows change. (Y3 - Light) • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials)	• Identify common appliances that run on electricity. (Y4 - Electricity) • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. (Y4 - Electricity) • 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. (Y4 - Electricity) • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (Y4 - Electricity) • Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)	• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - 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. (Y3 - Animals, including humans) • Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans) • Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)	• Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 - Living things and their habitats) • Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants) • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5)	• Recognise that living things can be grouped in a variety of ways. (Y4 -Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)
Future Learning	**Key Stage 2 End point**	**Key Stage 2 End point**	**Key Stage 2 End point**	**Key Stage 2 End point**	**Key Stage 2 End point**
Suggested Sequence of Lessons	1. A. Initial assessment of prior learning B. To recognise that light travels from a source in a straight line. Explore different light sources and group them under man-made, natural and reflectors. Investigate how a torch beam can be restricted and consider what this tells us about how light travels. Scientific diagram of how light travels and an explanation using scientific vocabulary. 2. To understand how we are able to see light. Explore how we see light by shining a torch in a dark room to show how light travels from a source, reflects off an object (or gives out light) and into our eyes. Learn that light must be reflected from non-luminous objects in order for them to be seen. Scientific diagram of how light travels and an explanation using scientific vocabulary. 3. To investigate how the direction	1. A. Initial assessment of prior learning B. To build a simple series circuit with functioning components. Learn about what makes up a complete circuit and explore the function of different electrical outputs within a simple circuit – battery, cell, wires, buzzer, bulb, switch and motor. Build and explore different circuits from a tray of components and identify why some work while others do not. 2. To recognise symbols when representing a simple circuit in a diagram. Identify universal symbols (used by scientists, technicians and engineers worldwide) that represent different electrical components and practise drawing them. Look at different simple circuits and use the universal symbols to draw them scientifically. Introduce	1. A. Initial assessment of prior learning. B. To understand the organisation of the circulatory system, its key parts and functions. Introduce the circulatory system and discuss what it does, what the major parts (arteries, veins, capillaries, lungs, heart) are and what their functions are, e.g. the heart pumps blood around the body. Create a diagram of the system. Label each part with its name and function in the system. 2. To know the parts of the heart and how they function. Explore the structure of the heart and find out how it works. Learn how the heart pumps blood around the body, needed to transport nutrients and oxygen (picked up from the lungs) to the organs and muscles. Learn about how the heart works and	1. A. Initial assessment of prior learning. B. To understand how inherited characteristics can lead to variation Discuss the meaning of variation and what causes it. Recognise variation within species. Introduce 'inheritance' as characteristics (physical/abilities) passed onto offspring from both parents. Explore examples as a class, e.g. hair colour, music talent. These are genetic and passed down in both parents mixed DNA – leads to variation. Identify examples of animal parents/offspring (dog breeding) and similar characteristics. 2. To understand that adaptations lead to variation (Moth – Isobel Thomas) Explore how 'variation' is caused not only by 'inheritance' but also by 'adaptation' – the characteristics influenced by the habitats and environments of living things. Look at different habitats (e.g. deserts) and environments (multiple habitats) and explore how different animals and plants are suited/adapted to live there.. Learn how the adaptations can occur over time (evolution) and allow some animals to	1. A. Initial assessment of prior learning. B. To give reasons for classifying organisms (animals, plants and micro-organisms) based on their similarities and differences. Explore how and why scientists (taxonomists) group and sort species of living things by their similarities and differences, through classification, in order to study their lives, characteristics and behaviours. Look at classification keys for sorting animals and plants and explore how they work. 2. To classify vertebrates and invertebrates by their characteristics and identify the features of the different subgroups. Explore the 2 main groups animals are classified into – vertebrates and invertebrates – and identify their key similarities and differences. Identify the 5 main groups of vertebrates (fish, amphibian, reptiles, birds and mammals) and use sorting trees to classify them by their subgroup features. Identify the 6 main groups of invertebrates (arachnids, molluscs, annelids, insects, crustaceans and echinoderms) and use sorting trees to classify them by their subgroup features. 3. To know the 5 main kingdoms of living organisms and identify the similarities and differences between them. Explore the 5 main kingdoms all

	that light is reflected in can be predicted. Explore light hitting different types of surfaces and how this affects the reflection. Test how mirrors can be used to change the direction of light, looking around corners and into concealed places. Investigate the 'Law of Reflection' by shining a light beam (incident ray) at different angles onto a mirror and recording the angle of the reflected light beam. Measure angles of incidence and reflection, using a torch, mirror and protractor to find out they are always equal. 4. Consolidate previous learning in a practical context by making a periscope. 5. To know how a shadow is formed and investigate how the way in which an object is presented relative to a light source affects the shape and size of a shadow cast. **Do: Observe, measure & Record** **Shadow Investigation** 6. To investigate how the size of a shadow changes in relation to the distance from a light source. Learn about how to carry out a full investigation, change, measure and control variables, and present findings in a creative way. **Some misconceptions to be aware of:** **Some children may think:** **• we see objects because light travels from our eyes to the object.**	simple circuit problems and challenge them to 'correct' or 'fix' the circuit so that it works and explain what has happened. 3. To associate the brightness of a bulb with the number and voltage of cells within a circuit. Discuss the difference between current and voltage (strength of the energy source) in a circuit and explore different batteries/cells and their voltage. **Plan: Ask Qs and plan an enquiry – Bulb Brightness** 4. To compare and give reasons for variations in how components function. Explore the concept of how different components (e.g. bulbs, wire length/thickness) affect the output of a circuit. Plan and carry out a full investigation, such as: does the length of wire affect the brightness of a bulb in a circuit? Focus on variables to be controlled, changed and measured (data logger), and draw conclusions. Learn that the amount of current in a circuit depends on how easily the electricity can flow and introduce the concept of 'resistance'. 5. To understand how the position of a switch will affect how a circuit works. Investigate how different arrangements of switches change how a circuit works. Explore and test circuits with switches in different positions and draw conclusions about how it makes the component operate differently. **6. Do: Observe and Measure - Conductive Dough** **Some misconceptions to be aware of:** **Some children may think:** **• larger-sized batteries make bulbs brighter** **• a complete circuit uses up electricity** **• components in a circuit that are closer to the battery get more electricity.**	what the function of the main parts are -atriums, ventricles, veins, arteries, lungs. 3. To investigate how pulse rate can be used to assess fitness and health. Explore what it means to live a healthy lifestyle and the impact this has on our circulatory system and heart, e.g. diet and exercise. Practise taking pulse (how fast the heart is beating) and learn that each heartbeat causes a movement in the arteries, taking blood away from the heart. Investigate how pulse rate changes when you exercise and what this tells us about the heart. Record a resting heart rate (pulse for 1 minute) and compare class results (60-100 beats per minute). Carry out different types of exercise for a set time and record changing pulse rate until it returns to normal. Draw conclusions from the data and conclude how the heart is affected by exercise. **4. Plan: Set up an Enquiry – Human Heart Rate** 5. To explain the role of the different parts of the circulatory system in transporting nutrients and water in the body. Explore different types of nutrients (e.g. carbohydrates, proteins) and why our body needs them. Recap on the digestive and excretory systems and recall the functions of the different parts in breaking down food and removing waste. Learn about how nutrients are broken down and absorbed into the blood stream, while water is absorbed by both intestines, while waste is excreted. Create a diagram to explain the transportation of nutrients and water. Research & explore how this system may be different in animals. 6. To draw on previous knowledge about the impact of diet, exercise and nutrition to understand and recognise the impact of drugs and alcohol on the way our bodies function. Explore the difference between illegal (alcohol, recreational drugs, cigarettes) and legal drugs (prescription). Research the impact they have on the body and its ability to function. Label organs of the body (liver, brain, lungs) that are affected and damaged, including explanations. Create group presentations to present to Year 5, sharing their findings about a specific drug, drawing conclusions.	survive, while others become extinct. Explore the 'adaptive traits' in a range of animals. (Pupils choose). 3. To identify how animals and plants are adapted to suit their environments in different ways. Explore different extreme environments (e.g. deep oceans, deserts, high mountains, arctic) and research organisms that live in the environment – their habitat type, abiotic challenges (non-living), organisms' adaptations and additional facts. Children present their findings in groups. 4. To learn how ideas about evolution have changed over centuries. Recap on the meaning of 'adaptation' and explore what 'evolution' means – the process of living things changing over time to suit/survive in their changing environment. Explore early ideas about life from philosophers – Anaximander (610-546BC), Empedocles (490-430BC) and Zhang Zhou (369 – 286BC). Compare with early ideas about evolution in the middle ages - Al-Jahiz (776-868) and Ibn Khaldun (1332-1406) more recent theories of evolutionary changes – Leclerc (1707-1788), Lamarck (1774-1829) and Alfred Wallace (1823-1913). Learn about Charles Darwin's 'Theory of Evolution' and what he based his ideas on. Explore how the different theories and ideas fit into the ideas of inherited and adapted traits. 5. To examine fossil evidence and explore Darwin's views on the evidence of fossil records. Explore different fossils and reinforce how they are not the bones/shells of creatures, but a mould left in the rock once dead. Establish how they were formed and discuss what we can learn from them. They tell us that animals that lived millions of years ago are now extinct, such as dinosaurs and other species continue to become. Learn about examples of extinct creatures and which animals they remind us of today, e.g. sabre-tooth cat related to a leopard. Learn that some animals/plants become extinct, but others slowly change into different variations that survive. **Review: Interpret, Report, Evaluate – Fossil Habitats** 6. To explain how animals and plants have evolved over time to survive in their habitat. Recap on the peppered moth and how it adapted and evolved over time in order to survive the changing habitat, e.g. hunts at night so changed colour to blend into the setting, wings changed colour to match the trees it lived on, dappled wings allowed them to blend into the background and tree bark. Compare images on the peppered moth over the years and discuss how it had to evolve in order to survive. Learn that variation from 'inheritance' and 'adaptation' allow them to survive.	living organisms are grouped into – plants, animals, fungi, protists and monera (micro-organisms). Learn about the different features of each kingdom and how they are similar and different, e.g. multicellular, produce their own food, reproduction system, movement. Look at the features for each kingdom, sort them into the 5 groups and identify examples of living organisms for each kingdom. 4. To understand the Linnaean system of classification, developed by Carl Linnaeus, and classify living organisms into one of the 5 Kingdoms. Explore the pioneering work by Swedish botanist, Carl Linnaeus, who created the first classification system for living things in the 1700's and consider the problems that would have been caused by no standard system to organise living organisms. Learn about the 7 levels (kingdom, phylum, class, order, family, genus, species) of the Linnaeus system and how he created a new way to name organisms by their genus and species. Practise classifying animals using his system and explore its effectiveness. 5. To recognise similarities and differences between plants and classify them by their characteristics, using a sorting key.Explore the kingdom of plants as one of the main living organisms and find out how they are different from other living things (e.g. they create their own food by photosynthesis). Identify how botanists have grouped plants into 2 main groups – flowering and non-flowering and explore their characteristics, linked to the work of Carl Linnaeus and his plant taxonomy. Look at classification keys for plants and create a key to sort leaves from the local environment. (front garden) 6. **Field Trip to Williamsons park** - To be able to identify and classify living organisms (plants, animals and micro-organisms) in the local environment and use sorting keys to classify them. **Plan: Ask Qs & Plan an Enquiry – Flower Sampling and Living Thing Keys** **Some misconceptions to be aware of:** **Some children may think:** **• all micro-organisms are harmful** **• mushrooms are plants**

			Some misconceptions to be aware of: **Some children may think:** **• your heart is on the left side of your chest** **• the heart makes blood** **• the blood travels in one loop from the heart to the lungs and around the body** **• when we exercise, our heart beats faster to work the muscles more** **• some blood in our bodies is blue and some blood is red** **• we just eat food for energy** **• all fat is bad for you** **• all dairy is good for you** **• protein is good for you, so you can eat as much as you want** **• foods only contain fat if you can see it** **• all drugs are bad for you.**	Explore/research other examples of evolving creatures/plants that have had to adapt over time to survive. Create research posters to explain how they adapted to suit their changing habitat. **Some misconceptions to be aware of:** **Some children may think:** **• adaptation occurs during an animal's lifetime: giraffes' necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life** **• offspring most resemble their parents of the same sex, so that sons look like fathers** **• all characteristics, including those that are due to actions during the parent's life such as dyed hair or footballing skills, can be inherited** **• cavemen and dinosaurs were alive at the same time.**	
Assessment	• **Now you see me!** • Explanation text describing scientifically how their periscope works.	• Design their own circuit to operate a model electrical appliance, such as a torch and explain how it works.	• Explanation text about the circulatory system and how it works. • **Get Your Blood Pumping**	• **Fantastic Foxes** • **What if all humans looked the same?** • **What if we could bring back Wooly Mammoths?**	**Invertebrate research** **Making Tracks** **Incredible Invertebrates**