Science Overview of Curriculum and Progression Map

Overview of Science Curriculum — **Year B**

	Autumn Term I	Autumn Term II	Spring Term I	Spring Term II	Summer Term I	Summer Term II
Class 4 (Years 5 & 6)	<u>Materials</u> • 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**. • 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. • Understand heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are **non- reversible.** • Observe indicators that something new has been made eg the properties of the material are different (colour, state, texture, hardness, smell, temperature)		<u>Forces</u> • 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 and water resistance** Understand, the harder it is to push the material out of the way the greater the resistance, gases weigh less than liquids and so water resistance is greater than air resistance • Explore the effects of frictional forces, that act between moving surfaces; Understand that **friction** is a **force against motion** caused by two surfaces **rubbing** against each other which occurs because no surfaces are perfectly smooth. • Recognise that some mechanisms including **levers pulleys and gears** allow a smaller force to have a greater effect.	<u>Sound</u> • Identify how sounds are made, associating some of them with something vibrating. • Know that when objects vibrate it makes the objects in contact with it also vibrate. This includes the air. • Understand that the **vibration** travels through the air and makes other objects it is in contact with vibrate including the **ear drum**. • Recognise when a sound is produced it spreads out from its source in all directions • Understand sounds have the properties of **pitch** and **volume.** • Explore how pitch and volume are changed by the way the material vibrates. • Understand the pitch of a sound is caused by how fast an object vibrates. This is called the **frequency** of vibration. Explain that higher the frequency, higher the pitch • Recognise that smaller objects or tighter strings tend to vibrate with a higher frequency. • Understand that the volume of sound is caused by how big each vibration is. This is called the **amplitude** of vibration. The bigger the amplitude the higher the volume. • Recognise that sounds get fainter as the distance from the sound source increases.		<u>Life cycles And Classification</u> • Describe the changes as humans develop to old age including changes at puberty. • 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 • Understand different types of reproduction including **sexual and asexual reproduction** in plants and sexual reproduction in animals • 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.
	• Pose questions in response to data collected. • Make scientific hypotheses • Know how to plan different types of scientific enquiry to answer a scientific question. • Recognise and use independent and dependent variables. • Know how to control variables.		• Take accurate measurements using a range of scientific equipment. • Understand how to read different scales using correct units of measure. • Use a range of apparatus. • Understand the need to take repeat measurements where necessary. • Be aware of possible sources of error in investigations. • Recognise and use dependent, independent and control variables. • Pose further questions based on data collected. • Know how to record data in more complex tables. • Plot results using appropriate graph – bar, scatter, line • Know how to use results linked to scientific knowledge to write a conclusion. • Report on findings in oral, visual or written displays or presentations.	• Pose questions in response to data collected. • Draw scientific diagrams using labels. • Know how to plan different types of scientific enquiry to answer a scientific question. • Take accurate measurements using a range of scientific equipment. • Know how to record results in more complex tables. • Plot results using appropriate graph(bar, scatter, line)		• Know how to use classification keys and classify living things. • Use reliable secondary sources of information. • Understand how some scientific ideas have developed over time.

Class 3 (Years 3 & 4)	<u>Rocks and soils</u> • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties; • Know that sedimentary rocks are made of **grains** squashed together and can contain the remains of long-dead organisms, called **fossils**. Examples of sedimentary rocks include **limestone** and **sandstone** • Know that **igneous and metamorphic rocks** are made of **crystals** locked tightly together. An example of igneous rock is **granite,** and an example of metamorphic rock is **slate.** • Explore the properties of different types of rock including **porosity**, **hardness**, reaction to chemicals • Describe in simple terms how fossils are formed when things that have lived are trapped within rock; • Know that **Soil** is made up of small broken-down pieces of rock and that soil contains a range of different size rock pieces • Know that soil also contains **humus** (rotted plant material)	<u>Light and Shadows</u> • Recognise that light is needed in order to see things and that dark is the absence of light; • Recognise that light appears to travel in straight lines; This can be represented by an arrow. • Know that light travels in straight lines and explain that objects are seen because they give out or reflect light into the eye; • Understand **the pupil** changes its size to allow enough, but not too much light into the eye. • Know that light is reflected from surfaces; • Recognise that light from the sun can be dangerous and how to protect their eyes; • Understand that if an object is **transparent** light will go through it and we will be able to see through it. • If an object is **opaque,** it will block the light and no light will get through. • If the material is **translucent,** it will allow light through, but we won't be able to see through it. • Recognise that **shadows** are formed when the light from a light source is blocked by an opaque object; •Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them • Find patterns in the way that the size of shadows change. <u>Habitats (Winter)</u> • Observe how a local habitat changes through the seasons.	<u>Magnets</u> • Compare how things move on different surfaces. • Know that some forces need contact between 2 objects, but magnetic forces work through other materials including air, so magnets don't need to be touching to **exert** their force. It is called a **non-contact force**. • Explore how magnets **attract** some materials and not others; • Compare and group together everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Understand the strength of magnetic forces is affected by: the strength of the magnet, the distance between the magnet and the object, the material the object is made from. • Describe magnets as having 2 **poles**. • Predict and observe how magnets **attract or repel** each other depending on which poles are facing and describe attractive or repulsive forces exerted.	<u>Electricity</u> • Identify common appliances that run on electricity. • Know electricity comes from a source and there are two main sources- **batteries and mains.** • Know a battery pushes electricity to the device and to push electricity the battery must be connected to the device using **wires.** This is called a **circuit.** • Be able to construct a simple series electrical circuit, identifying and naming its basic parts, **including cells, wires, bulbs, switches and buzzers;** • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery; • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit; • Recognise some common **conductors and insulators,** and associate metals with being good conductors. • Explore how more batteries added to a circuit provides a bigger push on the electricity. This will make the device work harder e.g., brighter bulbs, faster spinning motor, louder buzzer <u>Habitats (Spring)</u> • Observe how a local habitat changes through the seasons.		<u>Local habitats</u> • Understand that living things can be divided into groups based upon their **characteristics**. • Explore and use classification keys to help group, identify and name living things in the local environment. • Recognise that environments can change over time. • Observe how a local habitat changes through the **seasons** (Summer) • Understand impact of humans on the local **environment** (both positive eg nature reserves and negative eg pollution).
	• Make careful observations • Discuss criteria use to group or classify materials • Use secondary sources of information. • Make a prediction linked to understanding of scientific ideas. • Understand how to use results to write a conclusion.	• Know how to take measurements using a range of measures. • Know how to use equipment – light meter • Know how to set up a simple practical enquiry • Understand change and measure variables • With support, identify patterns in data. • Be able to construct a table to record data.	• Ask relevant questions that can be answered using different types of enquiry. • Understand change and measure variables. • Be able to control variables in a fair test. • Know how to plot a bar graph of results. • Understand how to use results to write a conclusion. • Make simple suggestions about how to make improvements to a practical test.	• Understand simple steps to work safely in science. • Be able to control variables in a fair test. • Draw labelled diagrams • Understand how to use results to write a conclusion. • Give a written, visual or oral presentation of results or conclusion. • Use relevant scientific vocabulary.		• Ask relevant questions that can be answered using different types of scientific enquiry. • Use secondary sources of information to answer some questions. • Make careful observations • Discuss criteria used to group living things. • Understand how to create a simple key.
Class 2 (Years 1 & 2)	<u>Human body</u> • Identify, name, draw and label the basic parts of the human body **including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth** and say which part of the body is associated with each sense.	<u>Properties of materials</u> • Be able to 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**;	<u>Changing Materials (changes of state)</u> **Focus on disciplinary knowledge** • Observe how ice changes when heated. • Describe and compare properties of ice and water.	<u>Classify animals</u> • 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**	<u>Comparing Habitats (Rainforest/ Local area)</u> • Identify that most living things live in **habitat**s to which they are suited • Describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other	<u>Changing materials</u> • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

	• Know that animals, including humans, have offspring which grow into adults.	• 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.		• Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals). • Explore and compare the differences between things that are l**iving, dead**, and things that have never been alive.	• Compare a range of contrasting habitats including those locally • 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.	
	• Know what a scientific question is. • Understand how to use secondary sources of information to answer questions. • Make comparisons using simple features. • Observe changes over time. • Use observations to suggest answers to questions.	• Use simple equipment • Make measurements using non-standard units of measure. • Identify simple patterns. • With support, know how to group and sort materials. • Know how to use results to answer a scientific question.	• Perform simple scientific tests • Identify change and measure variables. • Gather data to answer a question. • Know how to record data in a premade table. • Know how to use results to answer a scientific question.	• Identify living things • Make careful observations. • Make comparisons using simple features. • Identify simple patterns. • With support, know how to group and sort living things. • Use observations to suggest answers to a question.	• Understand how to use secondary sources of information. • Identify living things • Make comparisons • Gather different types of data to answer questions. • Use observations to suggest answers to questions.	• Perform simple scientific tests. • Make measurements using non-standard units of measure. • Identify change and measure variables. • Know how to record data into a table. • Know the purpose of a conclusion.
Class 1 (Year R)	Pick apples from trees, collect seeds, including from vegetables/ fruit. Explore fallen leaves, colours, texture, feel, throw into air – seasonal walk school/ village Human growth and body parts (RSHE links) Predicting sinking and floating in water play Play with ramps, cars, runs • Ask questions about things they want to know more about • Observe things carefully when directed to do so by an adult • Know the results of their actions • Try things out to see if they have the effect they want • Know that there are living things around them • Handle a range of objects that feel different • Explain to someone else what they have found out/ seen, using scientific vocabulary they have been introduced to		Caring for and looking at daffodils and other flowers, leaves forming, seasonal walk school/ village Plant seedlings, care for, grow potatoes Bird Watch – using keys to identify, owl stories Farm Visit Using water in play – adding cargoes to floating boats Temperature changes – freezing water with objects in, watching changes, snow/ frost play/ exploration, make ice shapes from one day to next • Ask questions about things they want to know more about • Observe things carefully when directed to do so by an adult • Know the results of their actions • Try things out to see if they have the effect they want • Know that there are living things around them • Handle a range of objects that feel different • Explain to someone else what they have found out/ seen, using scientific vocabulary they have been introduced to		Seasonal walk school/ village Farm visit, caring for animals, types, food sources Noticing minibeasts and changes to animal growth – caterpillars/ tadpoles in classroom, pond dipping Looking at shadows, sun safety **ELG: The Natural World** • Explore the natural world around them, making observations and drawing pictures of animals and plants; • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class; • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter **ELG: Creating with Materials (contributing to)** • Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function **ELG: Speaking (Contributing to)** • Offer explanations for why things might happen, making use of recently introduced vocabulary from stories, non-fiction, thymes and poems when appropriate	

Overview of Science Curriculum — Year A

	Autumn Term I	Autumn Term II	Spring Term I	Spring Term II	Summer Term I	Summer Term II
Class 4 (Years 5 & 6)	<u>Materials</u> • Compare and group everyday materials on the basis of their properties, **including hardness, solubility, transparency, thermal conductivity** and response to **magnets**; • Know all materials have mass (including gases). • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.	<u>Earth and Space</u> • Describe the sun, Earth and moon as approximately spherical bodies. • Understand that a **Solar system** is a collection of **planets**, which **orbit** (a curved path) a **star**. • Know that there are huge number of stars in space and therefore a huge number of solar systems • Know that our solar system consists of 8 planets, many of those planets have **moons** which orbit around them. • Our solar system can be represented with a model but it isn't possible to draw it to scale. • Know that the planets and moons are **rotating** and t he time it takes one planet to rotate is called a **day**. On Earth this is 24 hours.		<u>Electricity</u> • Know batteries have a limited store of energy and when this is gone, they can no longer push the **current** • Understand that when current passes through a device it makes it work • Know the larger the flow of current, the harder the device works and associate the brightness of a lamp or the volume of a buzzer with the number and **voltage** of cells used in the circuit; • Understand that parts of a circuit offer **resistance** (the slowing down of current) to electrical current including the wires. • Observe and understand that more devices added into a circuit the greater the resistance so less current flows around 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.	<u>The human body</u> <u>(Continue into Summer II)</u> • Identify and name the main parts of the **human circulatory system**, and describe the functions of the **heart, lungs, blood vessels and blood** • Know all animals need **oxygen** to survive. • Know air is breathed into the **lungs** where the oxygen in the air is passed into the blood. • Understand every part of animals' bodies need oxygen, especially **muscles**. • Know how the **heart** pumps blood in order to supply oxygen and sugar from the intestines to every muscle in the body. • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function	<u>Adaptation, Evolution and Inheritance</u> • Recognise that living things have changed over time and that **fossils** provide information about living things that inhabited the Earth millions of years ago • Know that the Earth is very old (4.2 **billion** years) and this is known by dating rocks • Know that life first appeared on Earth around 3.8 billion years ago which was at first, very simple but over **millions** and millions of years life became more complex through **evolution** • Understand how fossils form when dead organisms are rapidly buried or leave an imprint and are turned to stone over a long period of time. • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

		• Know the time it takes a planet to complete one orbit around its star is called a **year**. On Earth this is 356.25 days. • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. • Describe the movement of the moon relative to the Earth.		• Use recognised symbols when representing a simple circuit in a diagram. • Group materials on basis of **electrical conductivity**.	• Describe the ways in which nutrients and water are transported within animals, including humans	• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Understand that **evolution** is the change of physical form in a population over a long-time span and **natural selection** is the process which controls that change. • Understand that In any **population** there is **variation** and **competition** for resources (food, water, mates). • Understand that within that variation, organisms that have features which make them better **adapted** at securing food, water, and mates, are more likely to survive and produce **offspring** which have **inherited** those same successful features. Those that are not well adapted will eventually go **extinct**. • Understand that over a long enough timeline all organisms in a population will have those successful features.
	• Understand the need to take repeat measurements where appropriate. • Be aware of possible sources of error in investigations. • Ascertain the level of uncertainty in results and suggest ways test procedure could be improved. • Consider validity of results and understand repeatability. • Know how to record data in more complex tables. • Plot results using an appropriate graph (bar, scatter, line). • Know how to use collected evidence linked to knowledge to write a scientific conclusion. • Report findings in oral, written or visual presentations. • Know how to create classification keys and use to classify materials.	• Use reliable secondary sources of information. • Understand how some scientific ideas have developed over time. • Draw scientific diagrams using labels. • Use models to represent scientific concepts. • Identify scientific evidence that has been used to support or refute ideas or arguments		• Know how to plan different types of scientific enquiry to answer questions. • Pose questions in response to data collected. • Make scientific hypotheses. • Take accurate measurement using a range of scientific equipment. • Use a range of apparatus. • Suggest ways in which practical work can be carried out with regard to safety. • Recognise and use dependent, independent and control variables. • Draw scientific diagrams using labels. • Know how to record data in more complex tables. • Plot results using an appropriate graph (bar, scatter, line). • Ascertain the level of uncertainty in results and suggest ways test procedure could be improved. • Consider validity of results and understand repeatability. • Identify similarities, differences or changes related to simple scientific ideas and processes.	• Draw scientific diagrams using labels. • Use reliable secondary sources of information	• Draw scientific diagrams using labels. • Understand how some scientific ideas have developed over time • Identify scientific evidence that has been used to support or refute ideas or arguments • Use reliable secondary sources of information
Class 3 (Years 3 & 4)	<u>Human body</u> • Understand 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. • Know that different animals require different foods to survive. • Understand humans require a balanced diet to remain **healthy** • Understand different animals are **adapted** to eat different foods. • Describe the simple functions of the basic parts of the digestive system in humans (**mouth, tongue, teeth,**	<u>Water cycle</u> • Understand that heating causes liquids to **evaporate** to gases. • Understand that cooling causes gases to **condense** to liquids. • Identify the part played by **evaporation and condensation** in the **water cycle**. <u>Properties of materials – Thermal insulation</u> • Be able to compare different materials in how well they will insulate heat.		<u>Changes of state</u> • Compare and group materials together, according to whether they are solids, liquids or gases; • Understand that **Solids** hold their shape unless forced to change. • Understand **Liquids** flow easily but stay in their container because of **gravity**. The more **viscous** a liquid the less runny it is. • **Gases** move everywhere and are not held in containers by **gravity**. • Observe that some materials change state: • Understand that heating causes solids to **melt** into liquids and liquids to **evaporate** to gases.	<u>Plants</u> • Know plants have roots to provide support and to draw moisture from the soil, through **stem**s/ **trunk** to take water to the rest of the plant. • Know leaves absorb sunlight and carbon dioxide. • Know plants make their own food in their leaves to provide them with energy, grow, repair and reproduce. • Know plants also make **oxygen** which is given out back into the air through the leaves. • Understand flowering plants have evolved specific parts **(stamen, stigma, ovary, petal)** to carry out pollination, fertilisation and seed growth.	<u>Seashore habitats</u> • Understand that living things can be divided into groups based upon their **characteristics** • Explore and use classification keys to help group, identify and name living things in the wider environment (seashore and sea) • Know that in a habitat there are **food chains** • Construct and interpret a variety of food chains, identifying **producers, predators and prey.** • Understand nutrients produced by plants move to **primary consumer**s then to **secondary consumers** through food chains.

	oesophagus, stomach, and small and large intestine) • Identify the different types of teeth in humans and their simple functions • Identify that many animals have **skeletons** to support their bodies. • Know that all **vertebrates** have internal **skeletons** that protect **vital organs**. **Invertebrates** have **exoskeletons** that protect **vital organs**. • Understand how movable **joints** connect bones. • Understand that **muscles** are connected to **bones** and move them when they contract.			• Understand that cooling causes gases to **condense** to liquids and liquids to **freeze** to solids. • Measure or research the temperature at which this happens in degrees Celsius • Know that the temperature at which a substance **melts** from a solid to a liquid is the same at which it **freezes** from a liquid to a solid. • Know that the temperature at which a substance **boils** from a liquid to a gas is the same at which it **condenses** from a gas to a liquid	• Understand that seeds are **dispersed** in different ways and this improves chances of enough seeds **germinating** and growing to mature plants.	• Understand that the population of one organism in the chain or web is affected, it has a knock-on effect to all the others.
	• Use secondary sources of information to answer some questions. • Make a prediction linked to understanding of scientific ideas. • Make careful observations. • Draw labelled diagrams • Use relevant scientific vocabulary.	• Know how to take measurements using different units of measure. • Use a range of equipment (thermometer) • Know how to set up a simple practical enquiry. • Understand change and measure variables. • Be able to construct a results table.		• Use a range of equipment (data logger) • With support, identify patterns, similarities and differences in data. • Discuss criteria used to group materials. • Understand simple steps to work safely in science. • Construct a suitable table to record results • Understand how to use results to write a conclusion.	• Ask relevant questions that can be answered using different types of scientific enquiry. • Understand change and measure variables. • Be able to control variables in a fair test. • Understand how to use results to write a conclusion. • Know how to give a written visual or oral presentation of results and conclusions. • Make simple suggestions about how to make improvements to a practical test.	• Plan different types of scientific enquiry to answer a scientific question. • Make careful observations. • Understand how to use a simple key. • With support identify similarities and differences in data. • Discuss criteria used to sort or classify living things.
Class 2 (Years 1 & 2)	<u>Humans needs for survival</u> • Describe the basic needs of animals, including humans, for survival (**water, food and air**) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. <u>Weather and Seasons (Autumn)</u> • Observe changes across the 4 seasons • Observe and describe weather associated with the seasons and how day length varies	<u>Properties of materials</u> • Be able to 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.	<u>Uses of materials</u> **Focus on disciplinary 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. <u>Weather and Seasons (Spring)</u> • Observe changes across the 4 seasons • Observe and describe weather associated with the seasons and how day length varies	<u>Habitats in local area</u> • Identify and name a variety of common wild and garden plants, including **deciduous** and **evergreen** trees. • Identify and name a variety of plants and animals in their habitats, including **microhabitats** • Identify that most living things live **in habitats** to which they are suited • Describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • Compare a range of contrasting local 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	<u>Plants</u> • Identify and describe the basic structure of a variety of common flowering plants, including trees including **leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem** • Observe and describe how seeds and bulbs grow into mature plants • Describe how plants need water, light and a suitable **temperature** to grow and stay healthy. • Know that **seeds** and **bulbs** need water to grow but most do not need light (**germination**) • Know **roots** allow water to enter the plant and **shoots** produce leaves to collect sunlight.	<u>Weather and Seasons</u> • Know there are four **seasons**, **Spring**, **summer**, **autumn** and **winter** • Observe changes across the 4 seasons • Understand animals and plants have adapted ways of surviving the changing seasons include **hibernating**, storing food **migration**, loss of leaves • Observe and describe weather associated with the seasons and how day length varies
	• Understand how to use simple secondary sources of information to answer questions. • Use simple equipment • Perform simple tests • Make measurements using non-standard units of measure. • Understand what data is. • Gather data to answer questions.	• Identify objects and materials. • Make comparisons using simple features. • Identify simple patterns. • With support, know how to sort and group objects and materials.	• Know what a scientific question is. • Understand a scientific question can be answered in different ways. • Perform simple tests. • Identify change and measure variables. • Understand what data is. • Gather data to answer questions. • Gather different types of data eg photos, video drawings, diagrams	• Identify living things. • Make comparisons using simple features. • Identify simple patterns. • With support, know how to sort and group living things. • Understand how to use simple secondary sources of information to answer questions.	• Observe changes over time. • Make measurements using non-standard units of measure. • Use simple equipment. • Know how to record data into a simple pre-made table. • Understand that data can be clearer when results are displayed as a graph.	• Make careful observations. • Observe changes over time. • Gather different types of data eg photos video drawings. • Identify change and measure variables. • Use observations and ideas to suggest answers to questions. • Understand the purpose of a conclusion. • Know how to use results to answer a scientific question.

Overview of Progression Within Upham CE Primary School Science Curriculum

	Aspect	Foundations in Year R within EYFS ELG	KS1	Lower KS2	Upper KS2
Scientific Knowledge and Understanding			• 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 including **leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem** • Observe and describe how seeds and bulbs grow into mature plants • Describe how plants need water, light and a suitable temperature to grow and stay healthy. • Know that seeds and bulbs need water to grow but most do not need light (**germination**) • Know **roots** allow water to enter the plant and **shoots** produce leaves to collect sunlight.	• Know plants have roots to provide support and to draw moisture from the soil, through stems/ trunk to take water to the rest of the plant. • Know leaves absorb sunlight and carbon dioxide. • Know plants make their own food in their leaves to provide them with energy, grow, repair and reproduce. • Know plants also make **oxygen** which is given out back into the air through the leaves. • Understand flowering plants have evolved specific parts (stamen, stigma, ovary, petal) to carry out pollination, fertilisation and seed growth. • Understand that seeds are dispersed in different ways and this improves chances of enough seeds germinating and growing to mature plants.	
	Animals including humans	**ELG: The Natural World** • Explore the natural world around them, making observations and drawing pictures of animals and plants; • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class; -	• 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 including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth and say which part of the body is associated with each sense. • Know that animals, including humans, have offspring which grow into adults • Describe the basic needs of animals, including humans, for survival (water, food and air) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene	• Understand 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. • Know that different animals require different foods to survive. • Understand humans require a balanced diet to remain **healthy** • Understand different animals are adapted to eat different foods. • Describe the simple functions of the basic parts of the digestive system in humans (mouth, tongue, teeth, oesophagus, stomach, and small and large intestine) • Identify the different types of teeth in humans and their simple functions. • Construct and interpret a variety of food chains, identifying producers, predators and prey. • Understand nutrients produced by plants move to primary consumers then to secondary consumers through food chains. • Identify that many animals have skeletons to support their bodies. • Know that all **vertebrates** have internal **skeletons** that protect **vital organs**. **Invertebrates** have **exoskeletons** that protect **vital organs**. • Understand how movable joints connect bones. • Understand that muscles are connected to bones and move them when they contract.	• Describe the changes as humans develop to old age including changes at puberty • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, lungs, blood vessels and blood • Know all animals need **oxygen** to survive. • Know air is breathed into the **lungs** where the oxygen in the air is passed into the blood. • Every part of animals' bodies need oxygen, especially **muscles**. • Know how the **heart** pumps blood in order to supply oxygen and sugar from the intestines to every muscle in the body. • 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
	Living things and habitats		• Explore and compare the differences between things that are living, dead, and things that have never been alive. • Understand that all living things have certain characteristics that are essential for keeping them alive and healthy. • Identify that most living things live in habitats to which they are suited • Describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • Compare a range of contrasting habitats including those locally • identify and name a variety of plants and animals in their habitats, including microhabitats • 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	• Understand that living things can be divided into groups based upon their characteristics. • Explore and Use Classification keys to help group, identify and name living things in the local and wider environment • Know that in a habitat there are food chains and webs where nutrients are passed from one organism to another when it is eaten. • Understand that the population of one organism in the chain or web is affected, it has a knock-on effect to all the others • Recognise that environments can change over time • Observe how a local habitat changes through the seasons. • Understand impact of humans on the environment (both positive eg nature reserves and negative eg pollution deforestation)	• 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 • Understand different types of reproduction including sexual and asexual reproduction in plants and sexual reproduction in animals • 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.
	Seasonal changes	**ELG: The Natural World** • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter	• Know there are four **seasons**, **Spring**, **summer**, **autumn** and **winter** • Observe changes across the 4 seasons • Understand animals and plants have adapted ways of surviving the changing seasons include **hibernating**, storing food **migration**, loss of leaves		

			• Observe and describe weather associated with the seasons and how day length varies		
	Evolution and Inheritance				• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • Know that the Earth is very old (4.2 **billion** years) and this is known by dating rocks • Know that life first appeared on Earth around 3.8 billion years ago which was at first, very simple but over **millions** and millions of years life became more complex through **evolution** • Understand how fossils form when dead organisms are rapidly buried or leave an imprint and are turned to stone over a long period of time. • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Understand that **evolution** is the change of physical form in a population over a long-time span and **natural selection** is the process which controls that change. • Understand that in any **population** there is **variation** and **competition** for resources (food, water, mates). • Understand that within that variation, organisms that have features which make them better **adapted** at securing food, water, and mates, are more likely to survive and produce **offspring** which have **inherited** those same successful features. Those that are not well adapted will eventually go **extinct**. • Understand that over a long enough timeline all organisms in a population will have those successful features.
	Materials	**ELG: Creating with Materials (contributing to)** • Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function	•Be able to 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. • 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 the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	<u>Rocks</u> • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties; • Know that sedimentary rocks are made of **grains** squashed together and can contain the remains of long-dead organisms, called **fossils**. Examples of sedimentary rocks include **limestone** and **sandstone** • Know that **igneous and metamorphic rocks** are made of **crystals** locked tightly together. An example of igneous rock is **granite,** and an example of metamorphic rock is **slate.** • Explore the properties of different types of rock including **porosity**, **hardness**, reaction to chemicals. • Describe in simple terms how **fossils** are formed when things that have lived are trapped within rock; • Know that **Soil** is made up of small broken-down pieces of rock and that soil contains a range of different size rock pieces • Know that soil also contains **humus** (rotted plant material) <u>Changes of state</u> • Compare and group materials together, according to whether they are solids, liquids or gases; • Understand that **Solids** hold their shape unless forced to change. • Understand **Liquids** flow easily but stay in their container because of **gravity**. The more **viscous** a liquid the less runny it is. • Know that **Gases** move everywhere and are not held in containers by **gravity**. • Observe that some materials change state: • Understand that heating causes solids to **melt** into liquids and liquids to **evaporate** to gases. • Understand that cooling causes gases to **condense** to liquids and liquids to **freeze** to solids. • Measure or research the temperature at which this happens in degrees Celsius (°C);	• 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 all materials have mass. • 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. • Understand heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are **non-reversible**. • Observe indicators that something new has been made eg the properties of the material are different (colour, state, texture, hardness, smell, temperature)

				• Know that the temperature at which a substance **melts** from a solid to a liquid is the same at which it **freezes** from a liquid to a solid. • Know that the temperature at which a substance **boils** from a liquid to a gas is the same at which it **condenses** from a gas to a liquid. • Identify the part played by evaporation and condensation in the water cycle.	
	Light and Sound	ELG: Speaking (Contributing to) • Offer explanations for why things might happen, making use of recently introduced vocabulary from stories, non-fiction, thymes and poems when appropriate		Light • Recognise that light is needed in order to see things and that dark is the absence of light; • Recognise that light appears to travel in straight lines; This can be represented by an arrow. • Know that light travels in straight lines and explain that objects are seen because they give out or reflect light into the eye; • Understand the pupil changes its size to allow enough, but not too much light into the eye. • Know that light is reflected from surfaces; • Recognise that light from the sun can be dangerous and how to protect their eyes; • Understand that if an object is **transparent** light will go through it and we will be able to see through it. • If an object is **opaque,** it will block the light and no light will get through. • If the material is **translucent,** it will allow light through, but we won't be able to see through it. • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. •Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them • Find patterns in the way that the size of shadows change.	Sound • Identify how sounds are made, associating some of them with something vibrating; • Know that when objects vibrate it makes the objects in contact with it also vibrate. This includes the air. • Understand that the vibration travels through the air and makes other objects it is in contact with vibrate including the **ear drum**. • Recognise when a sound is produced it spreads out from its source in all direction. • Understand sounds have the properties of **pitch** and **volume.** • Explore how pitch and volume are changed by the way the material vibrates. • Understand the pitch of a sound is caused by how fast an object vibrates. This is called the **frequency** of vibration. Explain that higher the frequency, higher the pitch • Recognise that smaller objects or tighter strings tend to vibrate with a higher frequency. • Understand that the volume of sound is caused by how big each vibration is. This is called the **amplitude** of vibration. The bigger the amplitude the higher the volume. • Recognise that sounds get fainter as the distance from the sound source increases.
	Forces		•	Magnets • Compare how things move on different surfaces; • Know that some forces need contact between 2 objects, but magnetic forces work through other materials including air, so magnets don't need to be touching to **exert** their force. It is called a **non-contact force**. • Explore how magnets attract some materials and not others; • Compare and group together everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials; • Understand the strength of magnetic forces is affected by: • The strength of the magnet. • The distance between the magnet and the object. • The material the object is made from • Describe magnets as having 2 poles; • Predict and observe how magnets attract or repel each other depending on which poles are facing and describe attractive or repulsive forces exerted.	• 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 and water resistance** Understand, the harder it is to push the material out of the way the greater the resistance, gases weigh less than liquids and so water resistance is greater than air resistance • Explore the effects of frictional forces, that act between moving surfaces; Understand that **friction** is a **force against motion** caused by two surfaces **rubbing** against each other which occurs because no surfaces are perfectly smooth. • Recognise that some mechanisms including **levers, pulleys and gears** allow a smaller force to have a greater effect.
	Electricity		•	• Identify common appliances that run on electricity; • Know electricity comes from a source and there are two main sources- **batteries and mains.** • Know A battery pushes electricity to the device and to push electricity the battery must be connected to the device using **wires.** This is called a **circuit.** • Be able to construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers; • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery; • Recognise that **a switch** opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit;	• Know that **Current** is the flow of electricity around a circuit. • Understand the power supply in a circuit pushes the current round the circuit and the **voltage** of the power supply is a measure of this push. • Know batteries have a limited store of energy and when this is gone, they can no longer push the current • Understand that when current passes through a device it makes it work. • Know the larger the flow of current, the harder the device works and associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit;

				• Recognise some common **conductors and insulators**, and associate metals with being good conductors. • Explore how more batteries added to a circuit provides a bigger push on the electricity. This will make the device work harder e.g., brighter bulbs, faster spinning motor, louder buzzer.	• Understand that parts of a circuit offer **resistance** (the slowing down of current) to electrical current including the wires. • Observe and understand that more devices added into a circuit the greater the resistance so less current flows around 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.
	Earth and Space				• Describe the sun, Earth and moon as approximately spherical bodies; • Understand that a **Solar system** is a collection of **planets**, which **orbit** (a curved path) a **star**. • Know that there are huge number of stars in space and therefore a huge number of solar systems • Know that our solar system consists of 8 planets, many of those planets have **moons** which orbit around them. • Our solar system can be represented with a model but it isn't possible to draw it to scale. • Know that the planets and moons are **rotating** and the time it takes one planet to rotate is called a **day**. On Earth this is 24 hours • Know the time it takes a planet to complete one orbit around its star is called a **year**. On Earth this is 356.25 days • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. • Describe the movement of the moon relative to the Earth.
Disciplinary Knowledge – Working Scientifically	Asking and answering questions	• Ask questions about things they want to know more about	• Know what a scientific question is. • Understand a scientific question can be answered in different ways. • Understand how to use simple secondary sources of information to answer questions	• Ask relevant questions that can be answered using different types of scientific enquiry • Make a prediction linked to understanding of scientific ideas • Use secondary sources of information to answer some questions.	• Plan different types of scientific enquiry to answer a scientific question. • Pose questions in response to data collected. • Use reliable secondary sources of information. • Make scientific hypotheses
	Gather data	• Observe things carefully when directed to do so by an adult • Know the results of their actions	• Use simple equipment • Perform simple scientific tests • Make careful observations. • Gather different types of data to answer questions eg photos, videos, drawings, diagrams • Observe changes over time • Make measurements using non-standard units of measure	• Make careful observations • Know how to take measurements using a range of units of measure • Use a range of equipment including thermometers and data loggers. • Understand simple steps to work safely in science	• Take accurate measurements using a range of scientific equipment. • Understand how to read different scales and units of measure • Use a range of apparatus. • Understand the need to take repeat measurements where appropriate. • Be aware of possible sources of error in investigations. • Suggest ways in which to carry out practical work with regard to safety .
	Planning including variables	• Try things out to see if they have the effect they want	• Identify change and measure variables	• Know how to set up simple practical enquiry. • Understand change and measure variables. • Be able to control variables in a fair test (keep the same).	• Know how to plan different types of scientific enquiry in order to answer a scientific question. • Recognise and use independent and dependent variables. • Know how to control variables (keep the same)
	Identifying and classifying	• Know that there are living things around them • Handle a range of objects that feel different	• Identify objects, materials and living things. • Make comparisons using simple features • Identify simple patterns • With support, know how to sort and group objects, materials or living things.	• With support, identify patterns, similarities and differences in data • Discuss criteria used to group, sort or classify objects, materials or living things.	• Identifying differences, similarities or changes related to simple scientific ideas and processes • Know how to create classification keys and classify materials and living things.
	Recording data	• Explain to someone else what they have found out/ seen, using scientific vocabulary they have been introduced to	• Understand what data is • Gather data to answer questions • Know how to record data into a pre-made table. • Understand that data can be clearer when displayed as a graph.	• Be able to construct a suitable table to record results • Understand how to create a simple key • Know how to plot a bar graph from a set of results. • Draw labelled diagrams	• Know how to record data in more complex tables • Plot results using an appropriate graph: bar, scatter, line • Draw scientific diagrams using labels • Use models to represent scientific concepts.
	Report findings Use Scientific		• Use observations and ideas to suggest answers to questions. • Understand the purpose of a conclusion. • Know how to use results to answer a scientific question.	• Understand how to use results to write a conclusion • Use relevant scientific vocabulary. • Know how to give a written, visual or oral presentation of results and conclusions	• Know how to use collected evidence linked to knowledge to write a scientific conclusion. • Report findings in oral, visual or written displays or presentations. • Ascertain the level of uncertainty in collected results and suggest ways the test procedure could be improved.

	evidence to draw a conclusion			• Make simple suggestions about how to make improvements to a practical test.	• Consider the validity of the results and understand repeatability. • Pose further questions based on data collected. • Understand how some scientific ideas have developed over time. • Identify scientific evidence that has been used to support or refute ideas or arguments