Crow Orchard Primary School

Progression in Science

At Crow Orchard Primary School, our definition of progress is the widening and deepening of essential knowledge, skills, understanding and learning behaviours. We design, organise and sequence both our mixed age and single year group curriculum to ensure that children are not merely covering content but achieving a depth to their learning which enables them to use their skills and understanding in all areas of the curriculum.
This careful curriculum sequencing means that we build in opportunities to revisit previous learning, which allows them to build on their prior knowledge and gradually develop a deeper understanding of the skills and processes within subjects at their own pace and in the best possible way for each individual child.

Science progression	Foundation (Sequence towards KS1)	KS1 (Sequence Towards Lower KS2)		Lower kS2 (Sequence towards upper KS2)		Upper KS2 (Sequence towards the end of KS2)	
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Programme of study	**Living things – plants** **Living things – animals** **Environments** **Changes**	**Plants: Common Names and Basic Structure (Y1)** **Plants: Plant Growth (Y2)** **Environment - Living things and their habitats (Y2)**		• **Plants – Functions of Parts of a Plant) (Y3)** • **Environment – Living things and their habitats) (Y4)** •		• **Environment - Observing Life cycles (Y5)** • **Environment – Classification (Y6)** **Environment - Evolution and Inheritance (Y6)** • **Animals - Human Life Cycles (Y5)** • **Animals/Health – Exercise, Health & The Circulatory System (Y6)**	
Knowledge and Understanding	**Key Skills** **1.Ask questions** Demonstrate curiosity about the world around them. **2. Make predictions** With support or prompting, talk about what they think might happen based on their own experiences. **3. Decide how to carry out an enquiry**	**Plants: Common Names and Basic Structure Y1** – Pupils should be taught to: ▪ 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. **Plants: Plant Growth Y2** Pupils should be taught to: ▪ Observe and describe how seeds and bulbs grow into mature plants ▪ Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. ▪ Plants are living and eventually die		**Plants – Functions of Parts of a Plant) (Y3)** Pupils should be taught to: ▪ Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. ▪ Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. ▪ Investigate the way in which water is transported within plants. ▪ Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. ▪ Roots grow downwards and anchor the plant.		• **Environment - Observing Life cycles (Y5)** Pupils should be taught to: ▪ 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. **Pupils might work scientifically by:** ▪ Observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times). ▪ Asking pertinent questions. ▪ Suggesting reasons for similarities & differences.	

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	Respond to prompts to say what happened to objects, living things or events. **4. Take measurements** Use senses and simple equipment to explore the world around them, e.g. binoculars and magnifying glasses. **5. Record data** Talk to an adult about what has been found/found out. **6. Present data** Talk to an adult about what has been found/found out. 7**. Answer questions using data** With support, explain why some things occur. 8. **Draw conclusions** With support, talk about what they have found out or what they think might happen next/ change based on their own experience	▪ Observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or ▪ Observing similar plants at different stages of growth; ▪ Setting up a comparative test to show that plants need light and water to stay healthy. **Environment - Living things and their habitats (Y2)** Pupils should be taught to: ▪ Explore and compare the differences between things that are living, dead, and things that have never been alive. ▪ Identify that most living things live in habitats to which they are suited and describe how different habitats provide for 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. ▪ Different kinds of plants and animals live in different kinds of places. ▪ There are different kinds of habitat near school which need to be cared for ▪ Habitats provide the preferred conditions for the animals/plants that live there (compare local habitats and less familiar examples).	▪ Water, taken in by the roots, goes up the stem to the leaves, flowers and fruit. ▪ Nutrients (not food) are taken in through the roots. ▪ Stems provide support and enable the plant to grow towards the light. ▪ Plants make their own food in the leaves using energy from the sun. ▪ Flowers attract insects to aid pollination. ▪ Pollination is when pollen is transferred between plants by insects, birds, other animals and the wind. ▪ Fertilisation occurs in the ovary of the flower. ▪ Seeds are formed as a result of fertilisation. ▪ Many flowers produce fruits which protect the seed and/or aid seed dispersal. ▪ Seed dispersal, by a variety of methods, helps ensure that new plants survive. ▪ Plants need nutrients to grow healthily (either naturally from the soil or from fertiliser added to soil). **Pupils might work scientifically by:** ▪ Comparing the effect of different factors on plant growth, for example the amount of light, the amount of fertiliser; ▪ Discovering how seeds are formed by ▪ Observing the different stages of plant cycles over a period of time; ▪ Looking for patterns in the structure of fruits that relate to how the seeds are dispersed. ▪ Observing how water is transported in plants, for example, by putting cut, white carnations into coloured water. Observing how water travels up the stem to the flowers.	▪ They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. ▪ Observe changes in an animal over a period of time (for example, by hatching and rearing chicks). ▪ Comparing how different animals reproduce and grow. **Environment – Classification (Y6** Pupils should be taught to: ▪ 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. ▪ Living things can be grouped into micro-organisms, plants and animals. ▪ Vertebrates can be grouped as fish, amphibians, reptiles, birds and mammals. ▪ Invertebrates can be grouped as snails and slugs, worms, spiders and insects. Plants can be grouped as flowering plants (incl. trees and grasses) and non-flowering plants (such as ferns and mosses). **Pupils might work scientifically by:** ▪ Using classification systems and keys. ▪ Identifying some animals and plants in the immediate environment. ▪ Researching unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.

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Knowledge and understanding	Children know about similarities and differences in relation to: • Places - Different animal habitats. - Seaside and Ashton. • Objects - Fruits and vegetables. - Dough and cooked bread. - Making bigger/smaller shadows. - Floating and sinking. • Materials - Waterproof and not waterproof. - Strong and weak. - Recyclable and not recyclable. - Which materials melt in the Sun and which do not. • Living things - Body parts of familiar animals. - What owls and other birds eat. - Nocturnal and diurnal animals. - Adult and baby animals. - Pet shop animals. - How animals move. - Sounds animals make. - How plants grow without light, water, soil and air. **Knowledge** Children know about similarities and differences in relation to: • **Places -** Different animal habitats. - Seaside and Skelmersdale. •	**Pupils should be taught to:** ▪ Explore and compare the differences between things that are living, dead, and things that have never been alive. ▪ Identify that most living things live in habitats to which they are suited and describe how different habitats provide for 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. Different kinds of plants and animals live in different kinds of places. **Pupils might work scientifically by:** ▪ Sorting and classifying things as to whether they are living, dead or were never alive. ▪ Recording their findings using charts ▪ Describing how they decided where to place things, ▪ Exploring questions such as: 'Is a flame alive? Is a deciduous tree dead in winter?' ▪ Talking about ways of answering their questions. ▪ Constructing a simple food chain that includes humans (e.g. grass, cow, human);	▪ **Environment – Living things and their habitats – Y4** **Pupils should be taught to:** ▪ Recognise that living things can be grouped in a variety of ways. ▪ Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. ▪ Recognise that environments can change and that this can sometimes pose dangers to living things. ▪ Use and make identification keys for plants and animals. **Pupils might work scientifically by:** ▪ Using and making simple guides or keys [sorting, grouping, comparing, classifying] to explore and identify local plants and animals. ▪ Making a guide [sorting, grouping, comparing, classifying] to local living things. ▪ Raising and answering questions based on their observations of animals. What they have found out about other animals that they have researched	▪ **Environment - Evolution And Inheritance (Y6)** **Pupils should be taught to:** ▪ 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. **Pupils might work scientifically by:** ▪ Observing and raising questions about local animals and how they are adapted to the environment. ▪ Comparing how some living things adapt to survive in extreme conditions, e.g. cactuses, penguins and camels. ▪ Analysing the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.

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	Objects - Fruits and vegetables. - Dough and cooked bread. - Making bigger/smaller shadows. - Floating and sinking. • **Materials** - Waterproof and not waterproof. - Strong and weak. - Recyclable and not recyclable. - Which materials melt in the Sun and which do not. • Living things - Body parts of familiar animals. - What owls and other birds eat. - Nocturnal and diurnal animals. - Adult and baby animals. - Pet shop animals. - How animals move. - Sounds animals make. - How plants grow without light, water, soil and air. Features of their own immediate environment and how environments might vary from one another. • Playground, valley and Skelmersdale. • Comparison to seaside (e.g. Blackpool). **Changes** • Rainfall in Winter and Summer **Features of their own immediate environment and how environments might vary from one another.** • Playground, valley and Skelmersdale • Comparison to seaside (e.g. Blackpool).	▪ Describing the conditions in different habitats and micro-habitats (under log, on stony path, under bushes); ▪ Finding out how the conditions affect the number and type(s) of plants and animals that live there. There are different kinds of habitat near school which need to be cared for. **Pupils might work scientifically by using their observations to:** ▪ Compare and contrast animals (humans) at first hand or through videos and photographs. ▪ Using their senses to compare different textures, sounds and smells. ▪ Habitats provide the preferred conditions for the animals/plants that live there (compare local habitats and less familiar examples).		▪ **Animals - Human Life Cycles (Y5)** Pupils should be taught to: ▪ Describe the changes as humans develop to old age. ▪ Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire and excrete. **Pupils might work scientifically by:** ▪ Researching the gestation periods other animals and comparing them with humans. ▪ By finding out and recording the length and mass of a baby as it grows. **Animals/Health – Exercise, Health & The Circulatory System (Y6)** Pupils should be taught to: ▪ 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. ▪ The heart is a major organ and is made of muscle. ▪ The heart pumps blood around the body through vessels and this can be felt as a pulse. ▪ The heart pumps blood through the lungs in order to obtain a supply of oxygen. ▪ Blood carries oxygen/essential materials to different parts of the body.

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	Changes • Rainfall in Winter and Summer. **Vocabulary** General • Natural, wild, wildlife, native. Places • Habitats - Woodland, desert, ocean, jungle, Arctic. • Microhabitats: - Log, stone, tree, dead leaves, soil. • Seaside. Objects • British Autumn fruits and vegetables (e.g. apples, pears, beetroot, carrots, potatoes, butternut squash, sweetcorn, cauliflower). • Bread: - Mix, knead, prove, rise. Materials • Object, material, properties, suitable, pipette, recycling. • Properties - Waterproof, strong/weak, dense/less dense, hard/soft. • Materials Bubble wrap, foil, plastic, fabric, paper, straw, sticks, bricks, metal, glass. Living things – plants • Grow • Lifecycle: - Roots, shoots, stem, leaves, buds, flower • Water, light, warmth, temperature, soil, compost **Living things – animals** • Body parts. • Backbone, skeleton, soft body, shell. • Adapted, hibernate, migrate. • Predator, prey. • Nocturnal. • Adult/parent, baby. • Lifecycle: - Egg, caterpillar, chrysalis,			▪ During exercise muscles need more oxygen so the heart beats faster and our breathing and pulse rates increase. ▪ Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire and excrete. ▪ An adequate, varied and balanced diet is needed to help us grow and repair our bodies (proteins), provide us with energy (fats and carbohydrates) and maintain good health (vitamins and minerals). ▪ Tobacco, alcohol and other 'drugs' can be harmful. ▪ All medicines are drugs, not all drugs are medicines. **Pupils might work scientifically by:** ▪ Exploring the work of scientists. ▪ Scientific research about the relationship between diet, exercise, drugs, lifestyle and health. *Additional suggestion beyond NC2014 to support pupils working scientifically and to provide an opportunity to use ICT to collect/interpret data Observing/Measuring changes to breathing, heart beat and or pulse rates after exercise.

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	butterfly. • Birds (owl, duck), insects/bugs/ minibeasts (lacewing, ladybird, woodlouse, bee, wasp, spider, tarantula, earthworm, snail, locust, cricket, millipede, butterfly, caterpillar), fish, reptiles (snake, tortoise, gecko), amphibians, mammals (mouse, shrew, vole, hare, fox). **What animals give us -** Meat, roast chicken, bacon/ham, milk/cheese/ butter, wool, hair, eggs, honeycomb, honey. **Environment**s • Environment • Woodland, valley. • Playground. • Recycling, compost. **Changes** • Seasons: - Spring (growth, baby animals) - Summer - Autumn (Harvest) - Winter • Weather: - Sun, rain, wind, snow, ice, frost, sleet, hail. - Cold/warm/hot • Day length, day light.			
Programme of study	▪	**Animals – Humans (Y1)** **Animals – Other animals (Y1)** **Animals – Animal survival and growth (Y2)** **Health – How we grow and stay healthy (Y2)**	**Health - Health/Nutrition) (Y3)** **Animals - Skeletons and Movement (Y3)** **Animals, Teeth and Eating and Digestion (Y4)**	**Material Properties – Testing Material Properties (Y5)** **Material Changes – Reversible changes (Y5)** **Material Changes – Irreversible changes ((Y5)**

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Knowledge and understanding	▪	**Animals – Humans (Y1)** Pupils should be taught to: ▪ Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. ▪ Recognise that humans are animals. ▪ Compare and describe differences in their own features (eye, hair, skin colour, etc.). Recognise that humans have many similarities. **Animals – Other animals (Y1)** Pupils should be taught to: ▪ 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, and including pets). ▪ Find out and describe how animals look different to one another. ▪ Group together animals according to their different features. ▪ Recognise similarities between animals: ▪ Structure: head, body, way of moving, senses, body covering, tail. ▪ Animals have senses to explore the world around them and to help them to survive. ▪ Recognise that animals need to be treated with care and sensitivity to keep them alive and healthy. ▪ Animals are alive; they move, feed, grow, use their senses and reproduce.	**Health - Health/Nutrition) (Y3)** Pupils should be taught to: ▪ 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. ▪ An adequate and varied diet is beneficial to health (along with a good supply of air and clean water). Regular and varied exercise *from a variety of different activities* is beneficial to health (focus on *energy in versus energy out*. Include information on making informed choices). **Pupils might work scientifically by:** ▪ Comparing and contrasting the diets of different animals (including their pets). ▪ Decide ways of grouping them according to what they eat. ▪ Researching different food groups and how they keep us healthy. ▪ Designing meals based on what they find out. **Animals - Skeletons and Movement (Y3)** Pupils should be taught to: ▪ Identify that humans and some other animals have skeletons and muscles for support, protection and movement. ▪ Identify animals (vertebrates) which have a skeleton which supports their body, aids movement & protects vital organs (be able to name some of the vital organs). ▪ Identify animals without internal skeletons/backbones (invertebrates) and describe how they have adapted other ways to support themselves, move & protect their vital organs.	**Material Properties – Testing Material Properties (Y5)** Pupils should be taught to: ▪ 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. ▪ Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. ▪ Compare a variety of materials and measure their effectiveness (e.g. hardness, strength, flexibility, solubility, transparency, thermal conductivity, electrical conductivity). Temperature and Thermal Insulation ▪ Heat always moves from hot to cold. ▪ Some materials (insulators) are better at slowing down the movement of heat than others. ▪ Objects/liquids will warm up or cool down until they reach the temperature of their surroundings. **Pupils might work scientifically by:** ▪ Carry out tests to answer questions such as 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' ▪ Compare materials in order to make a switch in a circuit. **Material Changes – Reversible changes (Y5)**

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		Animal survival and growth -Y2 Pupils should be taught to: ▪ Notice that animals, have offspring which grow into adults. ▪ Find out about and describe the basic needs of animals, for survival (water, food and air). **Pupils might work scientifically by:** ▪ Observing, through video or first-hand observation and measurement, how different animals grow; ▪ Asking questions about what things animals need for survival suggesting ways to find answers to their questions. **Health – How we Grow and Stay Healthy (Y2)** Pupils should be taught to: ▪ Notice that humans, have offspring which grow into adults. ▪ Find out about and describe the basic needs of 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. ▪ Medicines can be useful when we are ill. Medicines can be harmful if not used properly **Pupils might work scientifically by:** ▪ Observing, through video or first-hand observation and measurement, how humans grow. ▪ Recording their findings using charts.	▪ Know how the skeletons of birds, mammals, fish, amphibians or reptiles are similar (backbone, ribs, skull, bones used for movement) and the differences in their skeletons. ▪ Know that muscles, which are attached to the skeleton, help animals move parts of their body. ▪ Explore how humans grow bigger as they reach maturity by making comparisons linked to body proportions and skeleton growth – e.g. do people with longer legs have longer arm spans? ▪ Recognise that animals are alive; they move, feed, grow, use their senses and reproduce. **Pupils might work scientifically by:** ▪ Identifying and grouping animals with and without skeletons. ▪ Observing and comparing their movement. ▪ Exploring ideas about what would happen if humans did not have skeletons. **Animals, Teeth and Eating and Digestion (Y4)** Pupils should be taught to: ▪ Describe the simple functions of the basic parts of the digestive system in humans. ▪ Identify the different types of teeth in humans and their simple functions. ▪ Construct and interpret a variety of food chains, identifying producers, predators and prey. ▪ Describe how teeth and gums have to be cared for in order to keep them healthy. **Pupils might work scientifically by:** ▪ Comparing the teeth of carnivores and herbivores.	▪ 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. ▪ Changes can occur when different materials are mixed. ▪ Some material changes can be reversed and some cannot. ▪ Recognise that dissolving is a reversible change. ▪ Distinguish between melting and dissolving. ▪ Mixtures of solids (of different particle size) can be separated by sieving. ▪ Mixtures of solids and liquids can be separated by filtering if the solid is insoluble (un-dissolved). ▪ Evaporation helps us separate soluble materials from water. ▪ Changes to materials can happen at different rates (factors affecting dissolving, factors affecting evaporation – amount of liquid, temperature, wind speed). ▪ Freezing, melting and boiling changes can be reversed (revision from YR4). **Material Changes – Irreversible changes (Y5)** Pupils should be taught to: ▪ 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.

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		▪ Asking questions about what things animals [humans]. need for survival and what humans need to stay healthy. ▪ Suggesting ways to find answers to their questions.	▪ Suggesting reasons for differences. ▪ Finding out what damages teeth and how to look after them. ▪ Drawing and discussing their ideas about the digestive system. ▪ Comparing them with models or images.	**Pupils might work scientifically by:** ▪ Observing and comparing the changes that take place, for example, when burning different materials or baking bread or cakes. ▪ Researching and discussing how chemical changes have an impact on our lives, for example cooking. ▪ Discuss [research] the creative use of new materials such as polymers, super-sticky and super-thin materials.
Programme of study	▪	**Material Properties – Everyday materials (Y1)** **Material Properties – Use of materials (Y2)**	▪ **Material Properties – Rocks (Y3)** **Properties and Changes – States of Matter (Y4)**	**Light and Astronomy – Earth and Space (Y5)** **Light and Astronomy – How Light travels (Y6)** **Forces – Effects on Movement (Y5)** **Electricity (Y6)**
Knowledge and understanding	▪	**Material Properties – Everyday materials (Y1)** **Pupils should be taught 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. **Pupils might work scientifically by:**	**Material Properties – Rocks (Y3)** **Pupils should be taught to:** ▪ Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. ▪ Describe in simple terms how fossils are formed when things that have lived are trapped within rock. ▪ Recognise that soils are made from rocks and organic matter. ▪ Rocks and soils can feel and look different. Rocks and soils can be different in different places/environments **Pupils might work scientifically by:**	**Light and Astronomy – Earth and Space (Y5)** **Pupils should be taught to:** ▪ Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. ▪ Describe the movement of the Moon relative to the Earth. ▪ Describe Sun/Earth/Moon as approximately spherical bodies. ▪ Use the idea of the Earth's rotation to explain day and night. ▪ The Earth spins once around its own axis in 24 hours, giving day and night. ▪ The Earth orbits the Sun in one year.

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		▪ performing simple tests to explore questions, for example: 'What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?' Pupils should be taught to: ▪ 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 ▪ Some materials can be found naturally; others have to be made **Material Properties – Use of materials (Y2)** Pupils should be taught to: ▪ 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 ▪ Some materials can be found naturally; others have to be made **Pupils might work scientifically by:** ▪ Comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs);	▪ Observing rocks, including those used in buildings and gravestones. ▪ Exploring how and why they might have changed over time. ▪ Using a hand lens or microscope to help them. ▪ Identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. ▪ Research and discuss the different kinds of living things whose fossils are found in sedimentary rock. ▪ Explore how fossils are formed. ▪ Explore different soils. ▪ Identify similarities and differences between them. ▪ Investigate what happens when rocks are rubbed together or what changes occur when they are in water. **Properties and Changes – States of Matter (Y4)** Pupils should be taught to Raise and answer questions about the way soils are formed. Pupils should be taught to: ▪ Compare and group materials together, according to whether they are solids, liquids or gases. ▪ Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). ▪ Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. ▪ Solids, liquids and gases can be identified by their observable properties.	▪ We can see the Moon because the Sun's light reflects off it. ▪ The Moon orbits the Earth in approximately 28 days and changes to the appearance of the moon are evidence of this. ▪ The Sun appears to move across the sky from East to West and this causes shadows to change during the day. ▪ Changes to shadow length over a day or changes to sunrise and sunset times over a year are evidence supporting the movement of the Earth. **Pupils might work scientifically by:** ▪ Comparing the time of day at different places on the Earth through internet links and direct communication. ▪ Creating simple models of the solar system. ▪ Constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day. Finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks. **Light and Astronomy – How Light travels (Y6)** Pupils should be taught to: ▪ 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 the light that travels from light sources to our eyes or from light sources to objects and then to our eyes.

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		▪ Observing closely, ▪ Identifying and classifying the uses of different materials, and ▪ Recording their observations. ▪ Thinking about unusual and creative uses for everyday materials.	▪ Solids have a fixed size and shape (the size and shape can be changed but it remains the same after the action). ▪ Liquids can pour and take the shape of the container in which they are put. ▪ Liquids form a pool not a pile. ▪ Solids in the form of powders can pour as if they were liquids but make a pile not a pool. ▪ Gases fill the container in which they are put. ▪ Gases escape from an unsealed container. ▪ Gases can be made smaller by squeezing/pressure. ▪ Liquids and gases can flow. **Pupils might work scientifically by:** ▪ Grouping and classifying a variety of different materials. ▪ Exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). ▪ Researching the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. ▪ Observing and recording evaporation over a period of time, such as a puddle in the playground or washing on a line. ▪ Investigating the effect of temperature on washing drying or snowmen melting. ▪ Additional suggestion from Lancashire for working scientifically opportunities which enhance learning and support using ICT. ▪ This unit provides an ideal opportunity for using data logging equipment to detect/measure and compare temperatures.	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. **Pupils might work scientifically by:** ▪ Deciding [observe/explore] where to place rear-view mirrors on cars. ▪ Designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. ▪ Investigating the relationship between light sources, objects and shadows by using shadow puppets. ▪ Extend their experience [explore and observe] of light by looking at a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur). ▪ **Forces – Effects on Movement (Y5)** **Pupils should be taught to:** ▪ 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. ▪ There are different types of forces (push, pull, friction, air resistance, water resistance, magnetic forces, gravity). ▪ Gravity can act without direct contact between the Earth and an object.

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				▪ Friction, air resistance and water resistance are forces which slow down moving objects. ▪ Friction, air resistance and water resistance can be useful or unwanted. ▪ The effects of friction, air resistance and water resistance can be reduced or increased for a preferred effect. More than one force can act on an object simultaneously (either reinforcing or opposing each other). **Pupils might work scientifically by:** ▪ Exploring falling paper cones or cup-cake cases. ▪ Designing and making [exploring] a variety of parachutes. ▪ Carrying out fair tests to determine which designs are the most effective. ▪ Exploring resistance in water by making and testing boats of different shapes. ▪ Design and make artefacts that use simple levers, pulleys, gears and/or springs and explore their effects. **Electricity (Y6)** **Pupils should be taught to**: ▪ 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. Circuit diagrams can be used to construct a variety of more complex circuits predicting whether they will 'work'.

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				Pupils might work scientifically by: ▪ Systematically identifying the effect of changing one [thing] component at a time in a circuit. ▪ Designing and making a set of traffic lights, a burglar alarm or some other useful circuit.
Programme of study	▪	**Light and Astronomy – Seasonal Change (Year1)**	**Light and Astronomy - Light, reflections and shadows) (Y3)** **Forces – Non contact forces) (Y3)** **Sound (Y4)** **Electricity (Y4)**	

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Knowledge and skills		**Pupils should be taught to:** ▪ Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies. **Pupils might work scientifically by:** ▪ Making tables and charts about the weather and ▪ Making displays of what happens in the world around them, including day length, as the seasons change. Additional suggestion from Lancashire for working scientifically opportunities which enhance learning and support using ICT across the curriculum ▪ This unit provides an ideal opportunity for using data logging equipment to record temperatures	**Light and Astronomy - Light, reflections and shadows) (Y3)** Pupils should be taught to: ▪ Recognise that they need light in order to see things and that dark is the absence of light. ▪ Notice that light is reflected from surfaces. ▪ Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. ▪ Recognise that shadows are formed when the light from a light source is blocked by a solid object. ▪ Find patterns in the way that the size of shadows change. ▪ **Pupils might work scientifically by:** ▪ Looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes **Forces (Non-contact) (Y3)** Pupils should be taught to: ▪ Compare how some things move on different surfaces. ▪ Notice that some forces need contact between two objects but magnetic forces can act at a distance. ▪ Observe how magnets attract or repel each other and attract some materials and not others. ▪ Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. ▪ Describe magnets as having two poles.	▪

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			Predict whether two magnets will attract or repel each other. **Pupils might work scientifically by:** ▪ Comparing how different things move and grouping them. ▪ Raising questions and carrying out tests to find out how far things move on different surfaces. ▪ Gathering and recording data to find answers to their questions. ▪ Exploring the strengths of different magnets and finding a fair way to compare them. ▪ Sorting materials into those that are magnetic and those that are not. ▪ Looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another. ▪ Identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets. depending on which poles are facing. **<u>Sound (Y4)</u>** Pupils should be taught to: Vibrations ▪ Identify how sounds are made, associating some of them with something vibrating. ▪ Recognise that vibrations from sounds travel through a medium to the ear. ▪ Find patterns between the volume of a sound and the strength of the vibrations that produced it. ▪ Recognise that sounds get fainter as the distance from the sound source increases.	

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			▪ Sounds can be made in a variety of ways (pluck, bang, shake, blow) using a variety of things (instruments, everyday materials, body). ▪ Sounds travel away from their source in all directions. ▪ Vibrations may not always be visible to the naked eye. **Pitch** ▪ Find patterns between the pitch of a sound and features of the object that produced it. ▪ Sounds can be high or low pitched. ▪ The pitch of a sound can be altered. ▪ Pitch can be altered either by changing the material, tension, thickness or length of vibrating objects or changing the length of a vibrating air column. Muffling/blocking sounds ▪ Recognise that vibrations from sounds travel through a medium to the ear. ▪ Sounds are heard when they enter our ears (although the structure of the ear is not important key learning at this age phase). ▪ Sounds can travel through solids, liquids and air/gas by making the materials vibrate. ▪ Sound travel can be reduced by changing the material that the vibrations travel through. ▪ Sound travel can be blocked. **Pupils might work scientifically by:** ▪ Finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses.	

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			▪ They might make ear muffs from a variety of different materials to investigate which provides the best insulation against sound. ▪ They could make and play their own instruments by using what they have found out about pitch and volume. **Electricity (Y4)** Pupils should be taught to: ▪ Identify common appliances that run on electricity. ▪ Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. ▪ Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. ▪ Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. ▪ Recognise some common conductors and insulators, and associate metals with being good conductors. ▪ Electricity can be dangerous. ▪ Electricity sources can be mains or battery. ▪ Batteries 'push' electricity round a circuit and can make bulbs, buzzers and motors work. ▪ Faults in circuits can be found by methodically testing connections. ▪ Drawings, photographs and diagrams can be used to represent circuits (although standard symbols need not be introduced until UKS2).	

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			Pupils might work scientifically by: Observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.	
Key stage 1	▪ **Sort / group / compare / classify / identify**	**Research** *finding things out using a wide range of secondary sources of information and recognising that scientific ideas change and develop over time*	**Recording of 'Explore / Observe'** *developing a deeper understanding of a wide range of scientific ideas encountering more abstract ideas*	**Questioning** *asking their own questions about scientific phenomena*
Key stage 1	**Year 1 –** Name/identify common examples and some common features (Y1/2). ▪ With help, decide how to sort and group objects, materials or living things. ▪ Say/identify how different things change objects, materials or living things. ▪ Make comparisons between simple observable features/characteristics of objects, materials and living things.	**Year 1** ▪ Find out about the work of famous scientists (historical & modern day) (Y1/2). ▪ Use simple and appropriate secondary sources (such as books, photographs and videos) to find things out / find answers. (Y1/2). Ask people questions (Y1/2	**Year 1** ▪ Begin to communicate and record their findings using simple scientific language. ▪ Begin to use simple scientific language to talk about what they have. ▪ Use their own ideas to offer answers to questions. ▪ Observe and discuss / talk about / draw/ keep records of changes over different periods of time. ▪ Observe closely and discuss / talk about / draw /record the features/properties of things in the real world. **Year 2**	**Year 1** ▪ Ask simple questions stimulated by the world around them. ▪ Demonstrate curiosity by the questions they ask **Year 2** ▪ Raise their own questions based on or linked to things they have observed.

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	▪ Say how things are similar or different. ▪ Recognise basic features of objects, materials and living things. ▪ **Year 2** ▪ Compare and contrast… a variety of things - focusing on the similarities as well as the differences] including how different things change over different periods of time [objects, materials or living things]. ▪ Sort and classify things according to a variety of different features (e.g. "I know it is living because it .. and it…). ▪ Decide how to sort and group objects, materials or living things. ▪ Name/identify a variety of common features and/or uses for objects, materials or living things. ▪ Name/Identify common examples and some common features.		▪ Record and communicate their findings using simple scientific language. ▪ Use their own ideas and their observations to offer answers to questions. ▪ Observe and describe simple processes/cycles with several steps e.g. growth cycle, simple food chain, saying how living things depend on one another. ▪ Recognise and describe a series of changes over time (e.g. growth). ▪ Observe, and record make drawings to represent things in the real world with some accuracy.	
Key stage 1	**Planning** ▪ *using different types of scientific enquiry making decisions about and explaining choices for testing*	**Equipment and measurement** *increasing complexity with increasing accuracy and precision make their own decisions about the data to collect*	**Communicating Recording** *recording data, reporting findings, presenting findings*	**Considering the results of an investigation / writing a conclusion**

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Key stage 1	**Year 1** ▪ Begin to choose/suggest ways to find answers. ▪ Perform simple tests/comparative tests. ▪ Talk about ways of answering their questions. ▪ Use different types of scientific enquiry. ▪ Experiment with a wide variety of things ▪ **Year 2** ▪ Set up a comparative test. ▪ In a group choose/suggest ways in which they might answer scientific questions. ▪ Suggest a [practical way] to find answers to their questions [and listen to the suggestions of others. ▪ Use different types of scientific enquiry to answer their own questions.	**Year 1** ▪ Observe using non-standard units e.g. how many lolly sticks/cubes/handfuls, etc. ▪ Observe closely, using simple equipment (e.g. hand lenses, egg timers). ▪ Observe closely using their senses (Y1). ▪ **Year 2** ▪ Observe more accurately by measuring non-standard and standard units. ▪ Use their senses, simple measurements and equipment to gather data with increasing independence. ▪ Gather data to help in answering questions.	**Year 1** ▪ Present their findings in a range of ways using templates where necessary e.g. talk/discuss; write/describe; draw pictures; annotated photographs; video; make/construct tables, charts and displays. ▪ Communicate their ideas to a range of audiences in a variety of ways. ▪ Begin to use some simple scientific language. **Year 2** ▪ Record and communicate their findings in a range of ways with increasing independence e.g. talk/discuss; write/describe; draw pictures; take photographs; video; make/construct a variety of tables, charts [including simple, bar charts produced as a group and displays. ▪ Make some choices on how to communicate their ideas to a range of audiences in a variety of ways. ▪ Use simple scientific language in their recording. ▪ Record simple data with some accuracy. Record data to help in answering questions.	**Describe results** **Year 1** Sequence photographs of an event/observation. ▪ Observe changes over different periods of time and discuss/talk/record about what has happened. Talk/ discuss/ describe/record about what they have seen/ what has happened. ▪ **Year 2** ▪ With guidance, begin to notice patterns	**Explain results** **Year 1** ▪ Read and spell scientific vocabulary (Y1/2). ▪ Suggest how things happen. ▪ Use their observations and ideas to suggest answers to questions. ▪ Begin to use simple scientific language to talk about what they have found out. Talk about what they have found out. ▪ **Year 2** ▪ Begin to explain how they	**Trusting my results**

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				and relationships. ▪ Order their findings. ▪ Recognise if results matched predictions. ▪ Talk/ discuss/ describe/record with some accuracy what they have seen/ what has happened.	know…use the word because "it is because…." (Y2) / suggest how and/or why things happen. ▪ Draw on use their results and their own experience to answer their questions. ▪ Begin to use simple scientific language to describe or explain what they have found out. ▪ Read and spell scientific vocabulary ▪ Listen to the suggestions of others.	

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Year group expectations LKS2	Sort / group / compare / classify / identify	Research *finding things out using a wide range of secondary sources of information and recognising that scientific ideas change and develop over time*	Modelling	Recording of 'Explore / Observe' *developing a deeper understanding of a wide range of scientific ideas encountering more abstract ideas*
	▪ Year 3 and 4 ▪ Compare and contrast functions, diets, teeth, changes over time. ▪ Record similarities and differences. ▪ Decide ways and give reasons for sorting, grouping, classifying, identifying things/objects, living things, processes or events based on specific characteristics. ▪	▪ Year 3 and 4 ▪ Create/invent design something based on what they have found out applying both research and/or practical experiences (Y3/4). ▪ Find out about the work of famous scientists historical and modern day (Y3/4). ▪ Finding things out using secondary sources of information (Y3/4). ▪	▪ Year 3 and 4 ▪ Act out something to represent something else about the world around us. ▪ Observe and record relationships between structure and function (Y3/4). ▪ Observe and record changes /stages over time (Y3/4). ▪ Explore / observe things in the local environment / real contexts and record observations (Y3/4). ▪ Record observations/explorations/ processes using simple scientific language. ▪	▪ Year 3 and 4
UKS2 expectations Y5 and 6	▪ Y5 - Compare and contrast things beyond their locality. ▪ Compare more complex processes, systems, functions (e.g. life cycles of different living things, organ systems of different animals). ▪ Suggest reasons for similarities and differences. ▪ ▪ Y6 -Compare and contrast things beyond their locality and analyse advantages/disadvantages, pros/cons of their findings.	Y5- Research the work of famous scientists (historical and modern day) and use this to find out how scientific ideas have changed over time. ▪ Find things out using a wide range of secondary sources of information. ▪ ▪ Y6 - Research the work of famous scientists (historical & modern day) and use this to] explain how scientific ideas have developed over time and had an impact on our lives. ▪ Interview [people to find out information and collect data]. ▪ Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.	▪ Y5 - Create simple models to describe scientific ideas (e.g. circulatory system). ▪ Use simple models to describe scientific ideas (e.g. of movements of the Sun and Earth, solar system, shadow clocks, magnetic compasses for navigation). ▪ Y6 - Identify some positives and some limitations of models used to describe/explain scientific ideas]. ▪ Use and make own versions of simple models to describe and explain scientific ideas (e.g. periscopes, simple lever, burglar alarm).	▪ Y5 - Read, spell and pronounce scientific vocabulary correctly (Y5/6). ▪ Use their developing scientific knowledge and understanding and relevant scientific language to discuss, communicate and explain their findings. ▪ Explore more abstract systems/functions/changes and record their understanding of these (e.g. circulatory system). ▪ Observe changes over different periods of time. ▪ Y6 - Encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates.

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	▪ Use and develop classification systems, keys and other information records [databases] to classify or identify. ▪ Compare and contrast more complex processes, systems, functions (e.g. sexual and asexual reproduction).			▪ Use correct scientific knowledge and understanding and relevant scientific language to explain their findings and justify their scientific ideas. ▪ Explore more abstract systems/functions /changes/behaviours and record their understanding of these (e.g. the relationship between diet, exercise, drugs, lifestyle and health; evolutionary changes; burning, rusting; reflection and refraction of light; friction, air resistance, gravity). ▪ Read, spell and pronounce scientific vocabulary correctly.		
	▪ **Questioning**	▪ **Planning**	**Equipment and measurement** ▪ *increasing complexity with increasing accuracy and precision make their own decisions about the data to collect*	**Communicating Recording** ▪ *recording data, reporting findings, presenting findings*		
LKS2 expectations	▪ Explore their own ideas about 'what if….?' scenarios e.g. humans did not have skeletons. ▪ Begin to understand that some questions are testable/ can be tested in the classroom and some cannot. ▪ Within a group suggest relevant questions about what they observe and about the world around them.	▪ Help to decide about how to set up a simple fair test and begin to recognise when a test is not fair. ▪ As a group, begin to make some decisions about the best way of answering their questions. ▪ With support/as a group, set up simple practical enquiries incl. comparative and fair tests e.g. make a choice from a list of at least one variable that needs to be kept the same when conducting a fair test. ▪ Find/suggest a way to compare things e.g. materials, magnets.	▪ Collect data from their own observations and measurements, using notes/ simple tables/standard units. ▪ Help to make some decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. ▪ Make simple accurate measurements using whole number standard units, using a range of equipment. ▪ Gathering data in a variety of ways to help in answering questions. ▪ Learn how to use new equipment, e.g. data loggers. ▪	▪ Record and present findings using simple scientific language and vocabulary, including discussions, oral and written explanations, notes, drawings annotated, pictorial representations, labelled diagrams, simple tables, bar charts [using ranges and intervals (scales) chosen for them] displays or presentations. ▪ Record, classify and present data in a variety of ways to help in answering questions. ▪ Communicate their findings in ways that are appropriate for different audiences. (Y3/4).		
UKS2 expectations Y5 and 6	▪ Raise different kinds of questions (Y5/6) ▪ Refine a scientific questions so that it can be investigated.	▪ Explain which variables need to be controlled and why. ▪ Make most of the planning decisions about] and carry out fair tests.	▪ Recognise that data might be unreliable and describe how to make it more reliable. ▪ Make their own decisions about what measurements to take [and identify the ranges and intervals used].	▪ Identify patterns that might be found in the natural	▪ Use their developing scientific knowledge and	▪ Use their results to identify when further

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	▪ Ask their own pertinent questions.	▪ Recognise when it is appropriate to carry out a fair test and plan how to set it up.	▪ Take measurements, using a range of equipment, with increasing accuracy and precision. ▪ Choose and use the most appropriate equipment to support observation, make measurements, collect data. ▪ Record data and results of increasing complexity (Y5/6) ▪ Follow [and suggest] safety guidelines	environment. ▪ Look for patterns and notice relationships between things [and describe these].	understanding and relevant scientific language to explain their findings. ▪ Draw conclusions based on their data and observations. ▪ Read, spell and pronounce scientific vocabulary correctly (Y5/6).	comparative tests and observations might be needed. ▪ Be able to explain differences in repeated measurements/readings or unexpected results. Recognise the limitations of some data.