CROSSDALE

Science Curriculum

Science Curriculum Statement

What do we want for our children as Scientists?

At Crossdale, our vision for science is for all children to develop scientific knowledge and conceptual understanding. All children will develop understanding of nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them and to be equipped with the scientific knowledge and vocabulary required to understand the uses and implications of science today and for the future. The children learn to work as scientists, asking scientific questions, using precise scientific vocabulary, and planning and undertaking practical investigations.

Science is taught through specific subject lessons which build and revisit knowledge as the children progress through school.

Wherever meaningful, links are made between science and other subjects, particularly literacy, maths, DT and ICT to consolidate learning.

At Crossdale, we aim to:

- to secure knowledge of the science contained within the programmes of study of the National Curriculum and beyond
- to provide a relevant, challenging and enjoyable Science Curriculum which is progressive in vocabulary, skills and knowledge
- to develop pupils' enjoyment and interest in science and an appreciation of its contribution to all aspects of everyday life (science fair, topic driven science)
- to build on pupils' curiosity and sense of awe of the natural world to deliver engaging and effective science lessons
- to build cultural capital and inspire children by developing a knowledge and appreciation of the contribution made by famous as well as familiar scientists (local scientist visits during our annual science week and visits to BGS)
- to encourage pupils to relate their scientific studies to applications and effects within the real world
- to develop creative thinking and curiosity
- to provide opportunities for co-operative working.

Intent - What do we teach, and when, in science?

As a school we have developed a systematic, progressive schema based on the National Curriculum. The curriculum builds on prior knowledge and, revisits learning and anticipates misconceptions using a scientific lens and an enquiry-based approach. *See documents below.*

Implementation – How will we carry out our vision?

We will implement our vision by teaching through a 'scientific lens'. As scientists, children will be taught to use **scientific vocabulary, make predictions, ask question, observe, measure, investigate, report, conclude and evaluate.**

Thinking like a scientist, children and teachers ask questions such as…

I wonder why this happens/ that changes? I can see… /I noticed…

How can you find… a pattern, a similar or different answer, proof, another variable?

I wonder if… I can change this/this happens every time/ can find a similar pattern?

What happens if…I add/I change/I see/I use? Do you think… we will always get this answer/you can prove your idea/you can change something/ this will always happen? What does this tell us about……?How can I show my findings/record the result/measure? Why does this happen /does it change / is it similar or different? What have I found out? What can I conclude from this?

What will I do next time?

Planning:

- A planning overview should be completed on the Crossdale Topic planning format and is driven by a **'big idea'. Skills, knowledge and vocabulary** are clearly identified, and lesson planning is supported by the use of key scientific questions with opportunities for spaced retrieval practice.
- **Plan Materials** unit plans & **Cornerstones Maestro** are used to support the planning process and the development of the lessons in detail on Smart or PowerPoint slides for lesson delivery.
- Knowledge organisers support teaching and learning and are similarly structured around the subject driver 'big idea' and key scientific questions that the children should know and remember by the end of the unit.
- The scientific lens for each lesson should be identified along with any questions that probe that lens.
- All planning should be uploaded onto All Staff at the start of every half term.
- A cross-curricular approach to planning topic with clear skills and knowledge taught, detailed and in line with the **'Thinking like a Scientist; what, where, when'** and the **'Science recording and reporting'** document.
- A least one written investigation should be recording per unit (see year group recording expectations below).
- Enrichment opportunities to promote cultural capital and British Values should be carefully planned and implemented through hooks for the start of the topic, trips, visitors and links with the local community.
- For HOT TASKS in science a blank Knowledge Organisers is used to assess what pupils know and have remembered.

Inclusion:

All children have access to the same curriculum entitlement. Support is given in order to ensure that any barriers to learning such as EAL or SEND are overcome meaning that all children can take part fully in all lessons.

Further information can be found in our statement of equality information and objectives, and in our SEND policy and information report.

Impact – How will we assess what the children know, remember and understand?

Teachers will monitor the impact of their teaching using:

- **AFL** during lessons (How children can answer enquiry questions)
- **Spaced retrieval** activities embedded into planning and practice
- **Knowledge organiser** based cold and hot tasks at the start and end of each topic to assess what knowledge has been remembered and what skills have been mastered.

The Subject Leaders monitor the way their subject is taught throughout the school by looking at the intent, implementation and impact using:

- Planning scrutiny & book dips to evaluate the impact of the big idea and enquiry questions
- Pupil Interviews/Learning Walks; assess impact of spaced retrieval, what is known & remembered?
- External & internal moderation for QA & to share best practise.
- SIL & Governor visits to monitor provisions and provide clear next steps.
- Planning and delivering CPD

The Subject Leaders also have responsibility for resources; storage & management. All of the monitoring information is used by the Subject Leaders to ensure our provision and pupil outcomes are the very best they can be. Any next steps to move the subject and the children's learning forward are fed into the Subject Leader's monitoring and action plans, which form part of the whole school improvement plan.

Governors monitor whether the school is complying with its funding agreement and teaching a "broad and balanced curriculum" which includes the required subjects, through:

Governor monitoring visits, the Head Teacher reports & the School Development Plan.

Elements of our Science Curriculum

Knowledge and Understanding

Scientists develop:

- a knowledge and understanding of scientific concepts across the three disciplines of biology, chemistry and physics

- a knowledge and understanding of the nature, processes and methods of science (working scientifically)

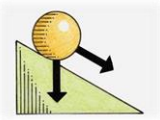
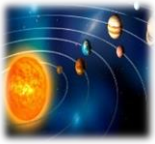
- a scientific vocabulary that includes both: high utility tier 2 words in a scientific context (such as energy) and tier 3 words that are domain specific (such as photosynthesis, evaporation)

Plants	**Living things and their habitats** **Animals including humans**		**Evolution and inheritance**
Seasonal changes	**Materials**	**Rocks**	**Light**
Forces	**Sound**	**Electricity**	**Earth and space**

Working Scientifically

Asking questions and hypothesising	**Observing and measuring**	**Undertaking practical enquiry to answer questions**
Recording and presenting evidence	**Answering questions and concluding**	**Evaluating and raising further questions**

Science Overview

	Autumn Term		Spring Term		Summer Term	
EYFS	All about Me 	Celebrations 	People Who Help Us 	Growing 	Habitats 	Under The Sea 
Year 1	Animals incl. humans 	Seasonal changes 	Animals incl. humans 	Seasonal changes 	Everyday Materials 	Green Plants & seasonal changes 
Year 2	Animals incl. humans 	Everyday Materials 	  Living things and their habitats & Animals, incl. humans		Living things and their habitats 	Green Plants 
Year 3	Animals incl. humans **(human focus)** 	Forces and Magnets 	Light and Dark 	Animals incl. humans **(animal focus)** 	Plants 	Rocks & Fossils 
Year 4	Electricity 		Sound 	States of matter 	Living things and their habitats 	Animals incl. humans and teeth 
Year 5	Properties & changes in materials 	Forces 	Earth and Space 	Living things and their habitats 	Animals inc. humans 	Plants 
Year 6	Electricity 	Animals incl. humans 	Light 	Living things and their habitats 	Animals incl. humans 	Evolution and Inheritance (I.D)

Y6- All animals including humans covered by DARE throughout the year.

Science Overview

	Autumn Term		Spring Term		Summer Term	
EYFS	**All about Me**	**Celebrations**	**People Who Help**	**Growing**	**Habitats**	**Under the Sea**
	What makes me different to others? *What changes outside in autumn?*	*What changes outside in winter?* *What's the difference between hot and cold things?*		*What things grow and what is a life-cycle?* *What changes outside in spring?*	*What is a habitat and what makes a good habitat?*	*What changes outside in summer?* *What is the seaside like and what animals live in the sea?*
Year 1	**Senses**	**Seasonal Changes**	**Animals inc. humans**	**Seasonal Changes**	**Materials**	**Green Plants & Seasonal Changes**
	What makes us wonderful?	*What are the four seasons and what are they like?*	*What animals are there and what do they eat?*	*What are the four seasons and what are they like?*	*What's it made of?*	*What is a plant? & What are the four seasons and what are they like?*
Year 2	**Wonderful Me**	**Materials**	**Animals inc. humans**		**Animals**	**Green Plants**
	What can our bodies do and what do they need to survive?	*Which material and why?*	*How do animals survive?*		*What is a habitat and how does it help animals to survive?*	*How do plants grow?*
Year 3	**Animals inc. humans**	**Forces & Magnets**	**Light**	**Animals inc. humans**	**Plants**	**Rocks & Fossils**
	What do we need to survive and how do our bodies help?	*What are forces and magnets?*	*Where do light sources come from and how do they help us see?*	*How do animals survive?*	*How do plants survive and reproduce?*	*How do rocks differ from one another?*
Year 4	**Electricity**		**Sound**	**States of Matter**	**Living Things & Their Habitats**	**Animals incl. humans**
	What is electricity?		*Why do we hear sound?*	*What is a solid, liquid and gas?*	*How do we classify things?*	*What happen when we eat?*
Year 5	**Properties of Materials**	**Forces**	**Earth & Space**	**Living Things & Their Habitats**	**Animals inc. humans**	**Plants**
	What changes can materials go through?	*How do forces affect us?*	*What is in our solar system?*	*How do animals change during their life cycle?*	*How do humans change as they grow?*	*How do plants reproduce?*
Year 6	**Electricity**	**Animals incl. humans**	**Light**	**Living Things & Their Habitats**	**Animals incl. humans (classification)**	**Evolution & Inheritance**
	How do we measure changes in electricity?	*DART*	*How does light reach our eyes?*	*What patterns can we notice in the characteristics of living things?*	*How does our heart keep us alive?*	*How do living things change over time to survive?* *HEALTHY HEARTS (TRENT BRIDGE)*

Y6- All animals including humans covered by DART and Positive Futures Healthy Hearts throughout the year.

Thinking like a scientist. As scientists, children will be taught to use the language and terminology of science and to explore and investigate different scientific phenomena in the world around us, share and record our findings.

Teaching children to think like a historian requires creating a **scientific lens** by teaching all of these concepts within a unit.

What we teach, where we teach it and when we teach it? (vocabulary, knowledge & topic)

Vocabulary and Lens Strand Progression							
Subject Content	Rec	Y1	Y2	Y3	Y4	Y5	Y6
Animals incl. humans; Biology	Body, human Animals and plants are alive. Label some common parts of the human face and body. ALL ABOUT ME	skeleton, organ Living things need to be cared for in order for them to survive. They need water, food, warmth and shelter. Label and describe the basic structure of a variety of common animals. Different animal groups have some common body parts, such as eyes and a mouth, and some different body parts, such as fins or wings. Group and sort a variety of common animals based on the foods they eat. WONDERFUL ME	reproduction, offspring, adult, survival, temperature, hygiene, exercise A healthy lifestyle includes exercise, good hygiene and a balanced diet. Hand washing and good hygiene are important parts of a healthy lifestyle and prevent the spread of germs. Human offspring go through different stages as they grow to become adults. These include baby, toddler, child, teenager and adult. Animals need water, food, air and shelter to survive. Their habitat must provide all these things. Compare and group things that are living, dead or have never been alive. WONDERFUL ME	vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect Identify and group animals that have no skeleton, an internal skeleton (endoskeleton) and an external skeleton (exoskeleton). OUR HEALTHY BODIES (human) THE ANIMAL KINGDOM. (other animals) Humans have to get nutrition from what they eat. It is important to have a balanced diet made up of the main food groups, including proteins, carbohydrates, fruit and vegetables, dairy products and alternatives, and fats and spreads. Humans need to stay hydrated by drinking water. OUR HEALTHY BODIES Compare and contrast the diets of different animals. OUR HEALTHY BODIES (human) THE ANIMAL KINGDOM (other animals) Humans have a skeleton and muscles for movement, support and protecting organs. Major bones in the human body include the skull, ribs, spine, humerus, ulna, radius, pelvis, femur, tibia and fibula. Major muscle groups in the human body include the biceps, triceps, abdominals, trapezius, gluteal, hamstrings, quadriceps, deltoids, gastrocnemius, latissimus dorsi and pectorals. OUR HEALTHY BODIES (human)	digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, esophagus, tongue, saliva, acid, bile, enzymes, incisors, canines, molars, predator, prey, producer, consumer, primary, secondary, tertiary Identify the four different types of teeth in humans and other animals, and describe their functions. HUMAN DIGESTIVE SYSTEM Regular teeth brushing, limiting sugary foods and visiting the dentist are important for good oral hygiene. HUMAN DIGESTIVE SYSTEM The digestive system is responsible for digesting food and absorbing nutrients and water. The main parts of the digestive system are the mouth, oesophagus, stomach, small intestines, large intestines and rectum. HUMAN DIGESTIVE SYSTEM	embryo, womb, adolescence Good personal hygiene (washing, wearing clean clothes and teeth brushing) can prevent disease or illness. Puberty is the period during which adolescents reach sexual maturity and become capable of reproduction. It causes physical and emotional changes. FROM FARM TO FORK Humans reproduce sexually, which involves two parents (one female and one male) and produces offspring that are different from the parents. FROM FARM TO FORK Humans go through characteristic stages as they develop to old age. These stages include baby, infant, toddler, child, adolescent, young adult, adult and senior citizen. Puberty is the transition between childhood and adulthood. FROM FARM TO FORK	artery, aorta, atrium, blood vessels capillary, circulatory system, vein, pulse, ventricle, replenished, resting heart rate, body Lifestyle choices can have a positive (exercise and eating healthily) or negative (drugs, smoking and alcohol) impact on the body. DART The circulatory system includes the heart, blood vessels and blood. There are three types of blood vessel: arteries, veins and capillaries. They each have a different-sized hole (lumen) and walls. The blood carries gases (oxygen and carbon dioxide), water and nutrients to where they are needed. The red blood cells carry oxygen and carbon dioxide), water and nutrients to where they are needed. The red blood cells carry oxygen and carbon dioxide around the body. The blood also contains white blood cells, which protect the body from infection. OUR DIVERSE PLANET Explain that the circulatory system in animals transports oxygen, water and nutrients around the body. The role of the circulatory system is to transport oxygen, water and nutrients around the body. They are transported in blood and delivered to where they are needed. OUR DIVERSE PLANET

Subject Content	Rec	Y1	Y2	Y3	Y4	Y5	Y6
Animals inc Humans, Living things and their habitats;	seasons, weather, life cycle, grow, change, healthy, unhealthy, habitat, plants and animals Animals and plants are alive and change as they grow. They live in different habitats. HABITATS & GROWING	energy, growth, habitat, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, seasons, weather, life cycle All living things (plants and animals) change over time as they grow and mature. WONDERFUL ME & GREEN PLANTS Identify, compare, group and sort a variety of common animals, including fish, amphibians, reptiles, birds and mammals, based on observable features. AMAZING ANIMALS SP1 Observe the local environment throughout the year and ask and answer questions about living things and seasonal change. The local environment is a habitat for living things and can change during the seasons. SEASONAL CHANGES Aut 2, Sp2, Sum 2.	birth, decay, energy, microhabitat, dead, life cycle, food chain, source, nutrients, reproduction, consumption, environment Living things are those that are alive. Dead things are those that were once living but are no longer. Some things have never been alive. Identify and name a variety of plants and animals in a range of habitats and microhabitats. Describe the basic life cycles of some familiar animals (egg, caterpillar, pupa, butterfly; egg, chick, chicken; spawn, tadpole, froglet, frog). Interpret and construct simple food chains to describe how living things depend on each other as a source of food. Describe a range of local habitats and habitats beyond their locality (rainforests, deserts, oceans and mountains) and what all habitats provide for the things that live there. Local habitats include parks, woodland and gardens. Habitats beyond the locality include beaches, rainforests, deserts, oceans and mountains. All living things live in a habitat to which they are suited and it must provide everything they need to survive.		kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution Compare, sort and group living things in a variety of ways based on observable features and behaviour. THE DARK AGES? Habitats change over time, either due to natural or human influences. These changes can pose a risk to animals and plants that live in the habitat. THE DARK AGES? An adaptation helps an animal or plant survive in its habitat. If living things are unable to adapt to changes within their habitat, they are at risk of becoming extinct. THE DARK AGES? Carnivores, herbivores and omnivores have characteristic types of tooth. Herbivores have many large molars for grinding plant material. Carnivores have large canines for killing and tearing meat. HUMAN DIGESTIVE SYSTEM THE DARK AGES? Construct and interpret a variety of food chains and webs to show interdependence and how energy is passed on over time. THE DARK AGES?	life cycle, life span, embryo, metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect A life cycle is the series of changes in the life of a living thing and includes these basic stages: birth, growth, reproduction and death. Mammals' life cycles include the stages: embryo, baby, adolescent and adult. Amphibians' life cycles include the stages: egg, larva (tadpole), adolescent and adult. THE EGYPTIANS Some insects' reproduction is the process of producing offspring and is essential for the continued survival of a species. There are two types of reproduction: sexual and asexual. Sexual reproduction involves two parents (one female and one male) and produces offspring that are different from the parents. Asexual reproduction involves one parent and produces offspring that is identical to the parent. FROM FARM TO FORK Research and describe different farming practices in the UK and how these can have positive and negative effects on natural habitats. Farming in the UK can be divided into three main types: arable (growing crops), pastoral (raising livestock), mixed (arable and pastoral). Intensive farming in the past has resulted in the loss of habitats. FROM FARM TO FORK	micro-organism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs Research unfamiliar animals and plants from a range of habitats, deciding upon and explaining where they belong in the classification system. Living things are classified into groups, according to common observable characteristics and based on similarities and differences. GREAT EXPLORERS Insulation is important for the survival of many animals. Blubber is a layer of fat that acts as an insulator under the skin of some animals, such as walruses and whales. It is an adaptation that is essential for their survival. Animals with fur, such as polar bears and Arctic foxes, trap a layer of air close to their skin to insulate them from the cold. GREAT EXPLORERS Environmental factors can affect the distribution of living things within a habitat. These factors include light (intensity and duration), weather, altitude, soil type and humans, such as when we mow or trample grass. GREAT EXPLORERS

Subject Content	Rec	Y1	Y2	Y3	Y4	Y5	Y6
Materials, Rocks, States of matter Physics, Earth Sciences, Chemistry Biology		absorption, matter, property, wood, plastic, glass, metal, water, rock Identify and name what an object is made from, including wood, plastic, glass, metal, water and rock. Investigate and describe the simple physical properties of some everyday materials, such as hard or soft; stretchy or stiff; rough or smooth; opaque or transparent; bendy or rigid; waterproof or not waterproof and magnetic or non-magnetic. Compare and group materials in a variety of ways, such as based on their physical properties; being natural or man-made and being recyclable or non-recyclable. MATERIALS	conductor, brick, paper, cardboard, friction, movement, suitability, surface, stretch, twist, waterproof, deformation, flexible, rigid Observe what happens when a range of everyday materials, including foods, are heated and cooled, sorting and grouping them based on their observations. Compare the suitability of a range of everyday materials for particular uses. A material's physical properties make it suitable for particular purposes, such as glass for windows and brick for building walls. Many materials are used for more than one purpose, such as metal for cutlery and cars. MATERIALS	extinction, igneous, metamorphic, sedimentary, paleontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil Investigate soils from the local environment, making comparisons and identifying features. ROCKS & RUMBLES Compare and group rocks based on their appearance, properties or uses. ROCKS & RUMBLES Describe simply how fossils are formed, using words, pictures or a model. ROCKS & RUMBLES	bond, condensation, evaporation, reversible, boiling point, melting point, liquid, gas, thermometer, water cycle, continuous precipitation, transpiration, surface run off process, sublimation Describe the water cycle using words or diagrams and explain the part played by evaporation and condensation. STATES OF MATTER Materials can be grouped according to whether they are solids, liquids or gases. STATES OF MATTER	irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallization, thermal, chemistry Reversible changes include heating, cooling, melting, dissolving and evaporating. Irreversible changes include burning, rusting, decaying and chemical reactions. COAL MINING Some mixtures can be separated by filtering, sieving and evaporating. Sieving can be used to separate large solids from liquids and some solids from other solids. Filtering can be used to separate small solids from liquids. Evaporating can be used to separate dissolved solids from liquids. COAL MINING Compare and group everyday materials by their properties, including hardness, solubility, transparency, conductivity (electrical and thermal) and magnetism. Materials can be grouped according to their basic physical properties. Properties include hardness, solubility, transparency, conductivity (electrical and thermal) and magnetism. COAL MINING	

Subject Content	Rec	Y1	Y2	Y3	Y4	Y5	Y6
Green plants; Biology Green plants; Biology	life cycle, grow, change, plants, fruit, vegetable, root, shoot Plants are alive and change. They need water and soil to grow. GROWING	component, energy, growth, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower Identify, compare, group and sort a variety of common plants, including deciduous and evergreen trees, based on observable features Label and describe the basic structure of a variety of common plants. The basic plant parts include root, stem, leaf, flower, petal, fruit, seed and bulb. Trees have a woody stem called a trunk. GREEN PLANTS	bulb, seed Plants need air, light, water, minerals from the soil and room to grow, in order to survive. Different plants have different needs depending on their habitat. Plants grow from seeds and bulbs. Describe how plants need water, light and a suitable temperature to grow and stay healthy. Plants need water, light and a suitable temperature to grow and stay healthy. Without any one of these things, they will die. GREEN PLANTS	extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization Flowers are important in the life cycle of flowering plants. The stages of a plant's life cycle include germination, flower production, pollination, fertilisation, seed formation and seed dispersal. Insects and the wind can transfer pollen from one plant to another (pollination). STONE AGE TO IRON AGE Name and describe the functions of the different parts of flowering plants (roots, stem, leaves and flowers). STONE AGE TO IRON AGE Investigate how water is transported within plants. Water is transported in plants from the roots, through the stem and to the leaves, through tiny tubes called xylem. STONE AGE TO IRON AGE		stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal Group and sort plants by how they reproduce. Label and draw the parts of a flower involved in sexual reproduction in plants (stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal). THE TUDORS	

Subject Content	Rec	Y1	Y2	Y3	Y4	Y5	Y6
Forces & Magnets; Physics	floating and sinking Making observations about if objects float or sink in water play trays. UNDER THE SEA			magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion An object will not move unless a pushing or pulling force is applied. Some forces require direct contact, whereas other forces can act at a distance, such as magnetic force. MAGNIFICENT METALS Magnets have two poles (north and south). Opposite poles (north and south) attract each other, while like poles (north and north, or south and south) repel each other. MAGNIFICENT METALS Some materials have magnetic properties. Magnetic materials are attracted to magnets. All magnetic materials are metals but not all metals are magnetic. The metal iron is magnetic. MAGNIFICENT METALS		acceleration, air resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance, weight Gravity is a force of attraction. Anything with a mass can exert a gravitational pull on another object. The Earth's large mass exerts a gravitational pull on all objects on Earth, making dropped objects fall to the ground. Mechanisms, such as levers, pulleys and gears, give us a mechanical advantage. A mechanical advantage is a measurement of how much a simple machine multiplies the force that we put in. The bigger the mechanical advantage, the less force we need to apply. KEYWORTH & WWI	

Subject Content	Rec	Y1	Y2	Y3	Y4	Y5	Y6
Seasonal Changes; Biology / Physics Light and Dark; Physics	spring, summer, autumn, winter There are four seasons: spring, summer, autumn and winter. Certain changes happen in the environment in different seasons. ONGOING	energy, freezing, melting, orbit, reflection, Sun, clouds, wind, snow, ice, spring, summer, autumn, winter, temperature, weather, thermometer The Earth is spherical and is covered in water and land. When it is daytime in one location, it is night-time on the other side of the world. The UK has typical weather in each of the seasons. For example, winter is cold and sometimes frosty, whereas summer is warm and sometimes sunny. SEASONAL CHANGES SP2 There are four seasons: spring, summer, autumn and winter. Certain events and weather patterns happen in different seasons. SEASONAL CHANGES Au 2 Simple equipment can be used for measuring weather, such as measuring temperature with a thermometer; SEASONAL CHANGES SP2 A shadow is formed when light from a light source, such as the Sun, is blocked by an opaque object but not transparent objects. Different types of weather include sun, rain, hail, wind, snow, fog, lightning, storm and cloud. SEASONAL CHANGES Su2 Day length (the number of daylight hours) is longer in the summer months and shorter in the winter months.		wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger Light from the Sun is damaging for vision and the skin. Protection from the Sun includes sun cream, sun hats, sunglasses, staying indoors or in the shade. THE GREEKS Dark is the absence of light, and we need light to be able to see. THE GREEKS A shadow is formed when light from a light source, such as the Sun, is blocked by an opaque object. Transparent objects allow light to pass through them and do not create shadows. Shadows change shape and size when the light source moves. For example, when the light source is high above the object, the shadow is short and when the light source is low down, the object's shadow is long. THE GREEKS Light can be reflected from different surfaces. Some surfaces are poor reflectors, such as some fabrics, while other surfaces are good reflectors, such as mirrors. THE GREEKS Group and sort materials as being reflective or non-reflective THE GREEKS		angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope The Sun, Earth, Moon and other planets and stars are roughly spherical. All planets are spherical because their mass is so large that they have their own force of gravity. This force of gravity pulls all of a planet's material towards its centre, which compresses it into the most compact shape – a sphere. THE SOLAR SYSTEM the sky. However, this is due to the Earth rotating and not the Sun moving. Earth rotates to the east or, if viewed from above the North Pole, it rotates anti-clockwise, which means the Sun rises in the east and sets in the west. As Earth rotates, different parts of it face the Sun, which brings what we call daytime. The part facing away is in shadow, which is night-time. THE SOLAR SYSTEM	wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger Light travels in straight lines. GREAT EXPLORERS Light sources give out light. They can be natural or artificial. When light hits an object, it is absorbed, scattered, reflected or a combination of all three. Light from a source or reflected light enter the eye. Vertebrates, such as mammals, birds and reptiles, have a cornea and lens that refracts light that enters the eye and focuses it on the nerve tissue at the back of the eye, which is called the retina. Once light reaches the retina, it is transmitted to the brain via the optic nerve. GREAT EXPLORERS 'White' light is a term used to describe visible, ordinary daylight. White light can be split into a spectrum of colours (rainbow) by droplets of water or prisms. Mirrors and lenses are used in a range of everyday objects (telescopes, periscopes, cards and on roads). The human eye has a lens that bends and focuses light on the back of the eye (retina) so that we can see. A shadow appears when an object blocks the passage of light. Apart from some distortion or fuzziness at the edges, shadows are the same shape as the object.

		SEASONAL CHANGES Au2					The distortion or fuzziness depends on the position or type of light source. Lasers are intense beams of light and they should never be pointed at people's faces or aircraft. GREAT EXPLORERS
Subject Content	Rec	Y1	Y2	Y3	Y4	Y5	Y6
Electricity; Physics					circuit, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, chemical reaction, emit Explain the precautions needed for working safely with electrical circuits. Describe materials as electrical conductors or insulators. Compare common household equipment and appliances that are and are not powered by electricity. THE HAUDENSAUNEE & THE USA & MOUNTAINS & RIVERS Predict and describe whether a circuit will work based on whether or not the circuit is a complete loop and has a battery or cell. THE HAUDENSAUNEE & THE USA & MOUNTAINS & RIVERS Construct operational simple series circuits using a range of components and switches for control. THE HAUDENSAUNEE & THE USA & MOUNTAINS & RIVERS		series circuit, parallel circuit, resistance, voltage Voltage is measured in volts (V) and is a measure of the difference in 'electrical energy' between two parts of a circuit. The bigger the voltage, the more electrons are pushed through the circuit. The more voltage flowing through a lamp, buzzer or motor, the brighter the lamp, the louder the buzzer and the faster the motor. There are recognised symbols for different components of circuits. WWII
Earth & The Solar System; Earth Sciences	JUST YEAR 5 planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, Moon, rotating, lunar, solar, telescope, rotation The Solar System is made up of the Sun and everything that orbits around it. There are eight planets in our Solar System: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. Earth orbits around the Sun and a year (365 days) is the length of time it takes for Earth to complete a full orbit. The Moon orbits Earth, completing a full orbit every month (28 days).						
Inheritance and evolution; Biology	JUST YEAR 6 evolution, natural selection, variation, advantageous Identify that living things produce offspring of the same kind, although the offspring are not identical to either parent. Animals that sexually reproduce generate new offspring of the same kind by combining the genetic material of two individuals. Each offspring inherits two of every gene, one from the female parent and one from the male parent. Describe how animals and plants can be bred to produce offspring with specific and desired characteristics (selective breeding). Animals and plants can be bred to produce offspring with specific and desired characteristics. This is called selective breeding. Examples include cows that produce large quantities of milk or crops that are disease-resistant.						

Sound, Physics	JUST YEAR 4 particle, vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum When an instrument is played, the air around or inside it vibrates. These vibrations travel as a sound wave. Sound waves travel through a medium, such as air or water, to the ear. Pitch is how high or low a sound is. Parts of an instrument that are shorter, tighter or thinner produce high-pitched sounds. Parts of an instrument that are longer, looser or fatter produce low-pitched sounds. Volume is how loud or quiet a sound is. The harder an instrument is hit, plucked or blown, the stronger the vibrations and the louder the sound.

Progress in WORKING SCIENTIFICALLY skills

NB - The National Curriculum statements in italics in these tables indicate that they feature more than once.

Asking questions and recognising that they can be answered in different ways

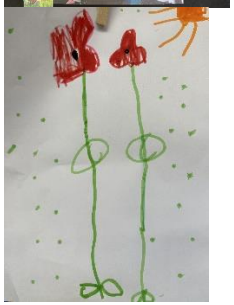
EYFS	Y1 and Y2	Y3 and Y4	Y5 and Y6
Asking questions about what they have observed • While exploring the world, the children develop their ability to ask questions (such as: what something is, how things are similar and different, why things happen and how things work). Where appropriate, they will suggest possible answers to these questions. • The children answer questions developed with the teacher often through modelling.	**Asking simple questions and recognising that they can be answered in different ways** • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.	**Asking relevant questions and using different types of scientific enquiries to answer them** • The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. • The children answer questions posed by the teacher. Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	**Planning different types of scientific enquiries to answer questions, including recognising and controlling variables, where necessary** • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.

Application in related substantive context			
What is this? Encourage description, e.g. green, living, part of a plant. How does the apple core change over time? How does the tree change over time? What happens to the boat on the water? Can light shine through the material? How are these (leaves, plants, seeds) similar/different? Link to key vocabulary	How are these animals the same and how are they different? (sorting into classification groups) What do plants need to grow? (set up simple enquiries where not all requirements for growth are provided) What are different materials used for and why? (link to testing properties of materials) Ask questions of a parent about how they look after their baby; Ask questions of a pet owner about how they look after their pet.	Ask questions about how plants disperse their seeds; Ask questions about the nutritional content of a range of food items (including fast food); Investigate patterns by asking questions such as: (i) can people with longer legs run faster? (ii) can people with bigger hands catch a ball better? Ask questions to test the properties of rocks and soils; Ask questions about the size of shadows and how they change; Ask questions about how objects move on different surfaces; Ask questions about evaporation rates for different liquids, e.g. puddles, washing, handprints on paper towels Ask questions about how we hear sound over distance/ through different materials	Plan to investigate properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat; Plan to investigate whether different liquids will effect how quickly a nail rusts; Plan to investigate forces (friction, water resistance, air resistance) in a range of contexts, e.g. brake pads, parachutes Plan a pulse rate investigation, e.g. effect of exercise; Explore different ways to demonstrate that light travels in straight lines; Plan to make a circuit to solve particular problems, such as a quiet and a loud burglar alarm.

Recording and presenting evidence			
Sorting and recording data to help in answering questions The children discuss their observations e.g. using photographs, practical demos as prompts They group together similar objects (for example, sorting rings)	**Gathering and recording data to help in answering questions** • The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. • They classify using simple prepared tables and sorting rings.	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions** **Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables** • The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams. • Children are supported to present the same data in different ways in order to help with answering the question.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.

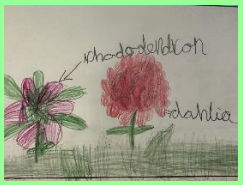
Application in related substantive context (Recording and presenting evidence)

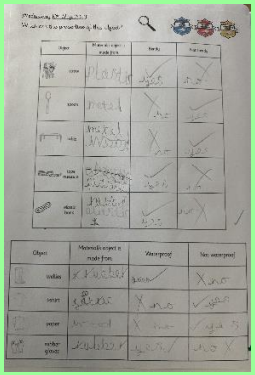
Draw pictures of animals appropriate to different settings/ habitats;
Draw different plants;
Group materials.

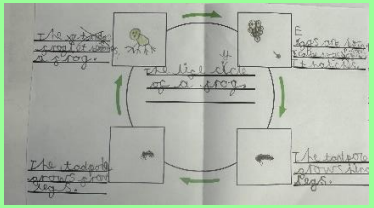


Collect information regularly over the year for aspects that change, e.g. weather, plants, clothing, animals – present this information in different ways to compare the seasons;
Draw labelled diagrams of the key parts of a plant;
Create simple food chains;

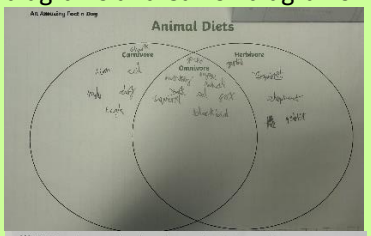
Focus on tally charts and pictograms.

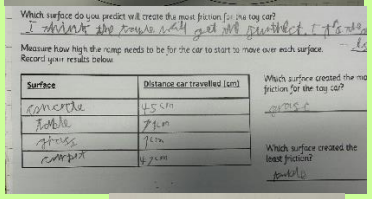


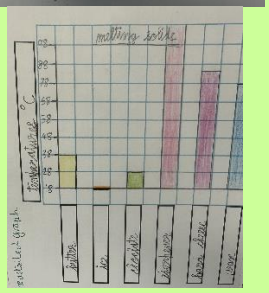




Compare, contrast and classify skeletons of different animals;
Classify rocks in a range of ways, based on their appearance (Venn or Carroll diagram);
Describe patterns in visibility of different objects in different lighting conditions; Show the change in shadow size over distance as a bar chart;
Bar chart of how far objects move on different surfaces; Use diagrams or a model to describe the journey of food through the body; Record freezing points of liquids and melting points of solids using a bar chart;
Identify good electrical conductors versus insulators.
Focus on bar charts, tables, Venn diagrams and Carroll diagrams.

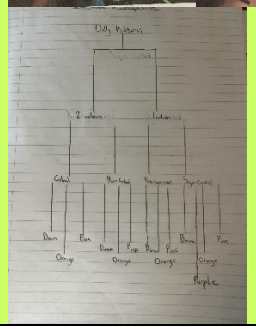






Present understanding of the life cycle of a range of animals in different ways e.g. drama, pictorially, chronological reports, creating a game;
Create a chart or table grouping/comparing everyday materials by different properties;
Use secondary sources to help create a model e.g. role play or using balls to show the movement of the Earth around the Sun and the Moon around the Earth;
Line graphs to show the time of fall compared to the width/surface area of parachute;
Scatter graph to show length of boat against time to travel set distance;
Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and classification keys;
Present information e.g. in a health leaflet describing impact of drugs and lifestyle on the body (link to DARE);
Labelled diagram of a plant/animal suited to a particular habitat;
Use light ray diagrams to show the reflection of light (in a straight line);
Communicate structures of circuits using circuit diagrams with recognised symbols.

Focus on line graphs and scatter graphs (Y5); Focus on all options plus classification keys (Y6)



Making observations and taking measuring

EYFS	Y1 and Y2	Y3 and Y4	Y5 and Y6
Explore and make observations of the natural world around them • Children explore the world around them and are encouraged to talk about what they see/notice. They make observations to support identification, comparison and noticing change. • Teachers model observational and investigational skills – for example, asking aloud: "I wonder what will happen if…"	**Observing closely, using simple equipment** • Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. • They begin to take measurements, initially by comparisons, then using non-standard units.	**Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers** • The children make systematic and careful observations. • They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).

Application in related substantive context (Making observations and taking measuring)			
Observe seasonal change; Observe properties of materials – I wonder what will happen if we pour water on this? Observe what animals are found where (zoo vs farm vs home) – I wonder what would happen if you had a giraffe as a pet? Link to 'Dear Zoo'	Careful observation of plants to identify (e.g. rose, sunflower, dandelion, oak tree); Take measurements of plant growth in different conditions; Observe habitats of mini-beasts; Measure daylength regularly over the year to compare; Observe materials used for various objects around school/home; Measure/observe how animals, including humans, grow; **Use non-standard units to measure**	Observe the movement of water up the stem of a flower and observe seed dispersal, noticing differences; Observe how rocks change over time, e.g. gravestones or old buildings; Measure water retention of soils using filter paper and measuring cylinder (ml/l); Measure size of shadows and how they change (mm/cm/m); Observe own teeth and those of different animals (herbivore, carnivore, omnivore) Investigate melting point of different materials e.g. ice, margarine, butter and chocolate (use thermometer – Celsius); Measure volume of sounds (data logger – dB); evaporation of liquids (time – seconds, minutes). **Use standard units of time, length, capacity and temperature to measure**	Observe asexual plant growth, e.g. spring onion; Investigate rates of dissolving (salt or sugar) by carrying out comparative and fair test at a range of temperatures; Measure the time it takes for a range of boats to travel a set distance in water (repeat readings and compare class data); Measure the mass and weight of various objects (repeat readings); Measure lung capacity by width of balloon and displacement of water from a bottle (repeat readings); Observe changes in 'caterpillar' population (link to secondary data); Investigate patterns by exploring which groups of people may have higher or lower resting pulse rates; **Select measuring equipment to suit purpose and use standard units of measure (g/kg, N, Celsius, milliseconds/seconds/minutes, ml/l, mm, cm, m)**

Engaging in practical enquiry to answer questions

EYFS	Y1 and Y2	Y3 and Y4	Y5 and Y6
Exploring and enquiring • The children use practical resources provided to explore and enquire (sand/water, construction, cooking, outdoor play, garden, small world). • Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. • Children use observations to group together similar objects and consider differences, patterns and change.	**Performing simple tests** • The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time. **Identifying and classifying** • Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.	**Setting up simple practical enquiries, comparative and fair tests** • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. **Explanatory note** *A comparative test is performed by changing a variable that is qualitative* *e.g. the type of material, shape of the parachute.* *This leads to a ranked outcome.* *A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship*	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary*** • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.

Application in related substantive context (Engaging in practical enquiry to answer questions)			
Regular consideration of seasonal changes; Mix sand, water and other liquids/ solids to see what happens; Experiment with floating and sinking objects; Observe heating/cooling, melting, dissolving and mixing; Push and pull vehicles and objects; Explore the natural environment.	Test properties of objects e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness for umbrellas; Explore the effect of exercise on the human body – observe changes in peers; Sort items into living, dead, non-living; Regular consideration of seasonal changes	Use food labels to explore the nutritional content of a range of food items; Devise a test to investigate the hardness of a range of rocks; Devise a test to investigate how much water different rocks/ soils absorb; Explore how shadows vary as the distance between a light source and an object or surface is changed; Explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc.; Devise an investigation to test the strength of magnets; Explore human impact on the local environment e.g. litter, tree planting; Explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing); Investigate how to melt ice more quickly; Explore altering the pitch or volume of objects, such as distance, the length of a guitar string, amount of water in bottles, size of tuning forks; Explore which materials can be used instead of wires to make a circuit.	Give reasons for choice of equipment and methods to separate a given solution or mixture such as salt and sand in water; Look for patterns between the size of an animal and its expected life span; Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced?; Make first-hand observations of how shadows caused by the Sun change through the day; Explore how levers, pulleys and gears work to understand what purpose each has in a machine; Investigate how long does it take my pulse rate to return to my resting pulse rate (recovery rate); Explore the uses of the behaviour of light, through reflection and shadows, such as in periscope design, rear view mirrors and shadow puppets.

	Asking questions and hypothesising		
Asking simple questions and While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which is better, how things change and what they think will happen).	**Asking simple questions and recognising that they can be answered in different ways** • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.	**Asking relevant questions and using different types of scientific enquiries to answer them** • The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. • The children answer questions posed by the teacher. • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary*** • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.

Evaluating and raising further questions			
EYFS	**Y1 and Y2**	**Y3 and Y4**	**Y5 and Y6**
Using experiences of natural change to make predictions. Children understand the predictability of seasonal change (weather, clothing, trees etc.)	**Using experiences of natural change and processes to make predictions.** • Children describe the predictability of seasonal change (weather, clothing, trees etc.) They understand basic changes of state (ice, water, steam)	***Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions*** • They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry. ***Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions*** • Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface. Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.	***Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data. **Using test results to make predictions to set up further comparative and fair tests** • Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.

Application in related substantive context (Evaluating and raising further questions)			
Predict clothing/weather/ what the trees will look like for different seasons.	Use property-testing evidence to select appropriate material for a purpose e.g. Which material is the best for a rain hat? Use learning about what plants need to grow to predict how well they will grow in, e.g., lemon juice? Predict what will happen to an ice lolly in various temperatures; Predict clothing/temperatures/ weather for different seasons.	Use a classification key to classify unknown plants and animals, based upon their features; Give similarities and differences between a range of skeletons; Identify plant/animal matter and rocks in samples of soil; Make predictions about patterns in how shadows vary over distance; Rank magnets: Make predictions for further tests regarding object movement on new surfaces e.g. it will spin for longer on this surface than that, but not as long as it spun on that surface; Create food chains based on research; Present their learning about the water cycle in a range of ways e.g. diagrams, explanation text, story of a water droplet; Choose switches to add to circuits to solve particular problems, such as a pressure switch for a burglar alarm	Predict results and answer questions by drawing on evidence gathered; Compare two or more life cycles they have studied; Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton) to predict their properties; Evaluate both the positive and negative effects of diet, exercise, drugs and lifestyle on the body; Identify characteristics that will make a plant or animal suited or not suited to a particular habitat; Predict and explain, with diagrams or models as appropriate, how the shape of shadows can be varied; Make circuits that can be controlled as part of a DT project.

Answering Questions and Concluding			
EYFS	**Y1 and Y2**	**Y3 and Y4**	**Y5 and Y6**
Using their experience, observations and ideas to suggest answers to questions • Children use their experiences of the world around them to suggest appropriate answers to questions.	***Using their observations and ideas to suggest answers to questions*** • Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources. ***Using their observations and ideas to suggest answers to questions*** • The children recognise 'biggest and smallest', 'best and worst' etc. from their data.	**Using straightforward scientific evidence to answer questions or to support their findings.** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence. **Identifying differences, similarities or changes related to simple scientific ideas and processes** • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. ***Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions*** • They draw conclusions based on their evidence and current subject knowledge	**Identifying scientific evidence that has been used to support or refute ideas or arguments** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. ***Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*** In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.

Application in related substantive context (Answering Questions and Concluding)			
Explain which animals live on a farm (link to 'What the Ladybird Heard'); Explain that materials have different properties (magnetic, transparent etc.); Understand that trees are plants and that these are living things; Explain how liquids and solids behave under different conditions (e.g. adding other things to the water or sand to cause a change)	Explain in simple terms why an animal or plant is suited to a habitat e.g. the caterpillar cannot live under the soil like a worm as it needs fresh leaves to eat; the seaweed we found on the beach cannot live in our pond because it is not salty; Explain what plants need to grow based on evidence gathered; Explain what materials are suited to different purposes; Explain the basic needs of animals/humans to survive (food, water and air); Explain how development and health might be affected by needs being met/ not met.	Explain methods of seed dispersal in plants based on observations; Talk about the nutrient content of their daily eating plan; Explain any patterns found, e.g. people with bigger hands catch a ball better; Link rocks changing over time with their properties e.g. soft rocks get worn away more easily; Explain, giving examples, that objects are not visible in complete darkness and that shadows are formed by blocking light; Identify that some metals, but not all, are magnetic; Use classification keys to identify unknown plants and animals; Explain how the teeth in animal skulls show they are carnivores, herbivores or omnivores; Explain what affects how quickly a solid melts; Explain what happens when you strike a drum or pluck a string and use a diagram to show how sounds travel from an object to the ear; Give reasons for choice of materials for making different parts of a switch in a circuit	Explain the results from their investigations; Use secondary sources and, where possible, first-hand observations to find out about the life cycle of a range of animals; Use test evidence gathered about different properties to suggest an appropriate material for a particular purpose; Consider the views of scientists in the past and evidence used to deduce shapes and movements of the Earth, Moon and planets before space travel; Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation; Use information about the characteristics of an unknown animal or plant to assign it to a group; Compare the ideas of Charles Darwin and Alfred Wallace on evolution; Explain how evidence from enquiries shows that light travels in straight lines.

National Curriculum Coverage for Science

	WS DRIPS	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year One:		Animals incl. humans; sense (Year B only) Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	Seasonal Changes (ongoing topic) Observe changes across the four seasons. Observe and describe the weather associated with the seasons and how day length varies.	Animals incl. humans ; chicks. Identify and name a variety of common animals. Identify and name variety of common animals that are carnivores, herbivores and omnivores. Describe and compare the structure of a variety of common animals.	Seasonal Changes (ongoing topic) Observe changes across the four seasons. Observe and describe the weather associated with the seasons and how day length varies. Light and Dark Observe and name a variety of sources of light, including electric lights, flames and the Sun Associate shadows with a light source being blocked by something.	Materials 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 based on their physical properties. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Green plants 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. Seasonal Changes (ongoing topic) Observe changes across the four seasons. Observe and describe the weather associated with the seasons and how day length varies.
Year Two		Animals incl. humans ; Notice that animals, including humans have offspring which grow into adults. Find out about an describe the basic needs of animals including humans, for survival (air, water, food) Describe the importance for humans of exercise, eating the right amounts of food, and hygiene,	Materials Identify and compare the uses of everyday materials and particular uses. Compare how things move on different surfaces.	Animals incl. humans ; Notice that animals, including humans have offspring which grow into adults. Living things and their habitats; Chicks. Explore and compare the difference between things that are living, dead and things that have never been alive. Identify that most things live in habitats to which they are suited and describe how these habitats provide the provide the basic needs, and depend on each other. Describe how animals obtain their food from plants and animals; use food chains and identify food sources.		Living things and their habitats; Identify that most things live in habitats to which they are suited and describe how these habitats provide the provide the basic needs, and depend on each other. Identify and name a variety of plants and animals in their habitats, including micro-habitats.	Green plants Observe and describe how seeds ad bulbs grow into mature plants. Find out about and describe how plants need water, light and a suitable temperature to grow and stay healthy.
Year Three		Animals, including humans Identify that animals, including humans need the right types of nutrition, and that they cannot make their own food; they get nutrition from what they eat. Identify that humans and some animals have skeletons	Forces & Magnets Notice that some forces need contact between two objects, but magnetic forces can act at a distance. 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	Light and Dark Recognise that they need light in order to see things and that dark is the absence of light. Recognise that shadows are formed when light from a light source is blocked by a solid object. Notice that light is reflected form different surfaces.	Animals, inc humans Identify that animals, including humans need the right types of nutrition, and that they cannot make their own food; they get nutrition from what they eat. Identify that humans Identify that humans and	Plants Identify and describe the functions of different parts of flowering plants. Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to	Rocks Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties Recognise that soils are made from rocks and organic matter.

		and muscles for support, protection and movement. (human focus)	Observe how magnets attract or repel each other and attract some materials and not others. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other.	Find patterns in the way that the size of shadows change. 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.	some animals have skeletons and muscles for support, protection and movement. (animal focus)	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.	Rocks Describe in simple terms how fossils are formed when things that have lived are trapped within rock
Year Four		Electricity Identify common appliances that run on electricity. Construct a simple series circuit, Identifying its basic parts (cells, wires, bulbs, switches, buzzers). Identify whether or not a lamp will light in a simple series circuit. 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.		**Sound** Identify how sounds are made, associating some of them with something vibrating. Find the pattern between pitch of sound and features of the object that produced it. Find patterns between the volume of sound and the strength of the vibrations that produced it.	States of matter Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius . Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Living things and their habitats Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments change and that this can sometimes pose dangers to living things. Animals, incl. humans Construct and interpret a variety of food chains, identifying producers, predators and prey.	Animals, incl humans Describe the simple function of the basic parts of the digestive system in humans Identify the different types of teeth in humans and their simple functions
Year Five		Properties of changes of Materials Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes.	Forces 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.	Earth & The Solar System Describe the movement of the Earth and other planets relative to the sun in the solar system. Describe the movement of the moon relative to the Earth. Describe the sun, Earth and moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. Forces - Gravity Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.	Living things and their habitats Explain the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproductions in some plants and animals.	Living things and their habitats (Plants) Describe the life process of reproductions in some plants.	Animals, incl humans Describe the changes as humans develop into old age. Describe the life process of reproductions in some plants and animals (humans).

		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.					
Year Six		Electricity Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Use recognised symbols when representing a simple circuit in a diagram.	Animals, incl. humans Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.	Light Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	Living things and their habitats; classification 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.	Animals, incl. humans Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Describe the ways in which nutrients and water are transported within animals, including humans.	Inheritance and evolution 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.

Knowledge Organiser Guidance (use A4 format)

Knowledge organisers are a summary of the key facts, the powerful essential knowledge that pupils need to access a unit of work or a curriculum subject.
They should be no more than one side of A4 with all the information broken down into easily digestible chunks, in this way they become an effective resource to support teaching and learning.

The knowledge included should be concise and should come back to the big idea and cover all enquiry questions from the unit of work.

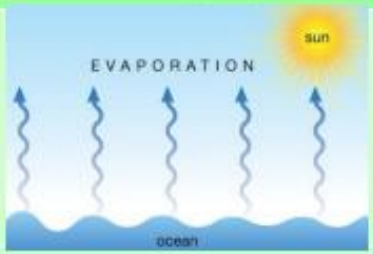
- Colour: green
- 'Big Idea' and subject: at the top
- Vocabulary: in a table on the left with alternating colour rows (child friendly definitions)
- No more than 7-9 labels on diagrams, events on a timeline or locations on a map.
- Use labelled visuals ONLY where it shares knowledge as dual coding (not for design or decoration)
- Use the same diagrams on your knowledge organiser as you do in the lessons.
- TABLES predominantly used to show concise sticky knowledge for the unit – they should be quizzable.
- There is not a limit on the boxes used but ensure they are in line and uniform.

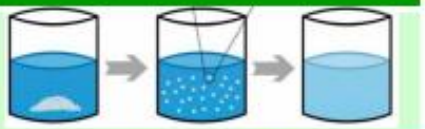
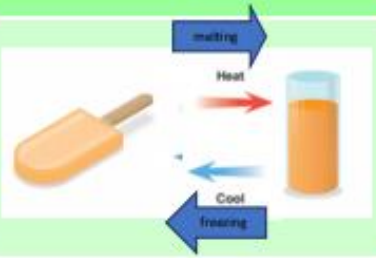
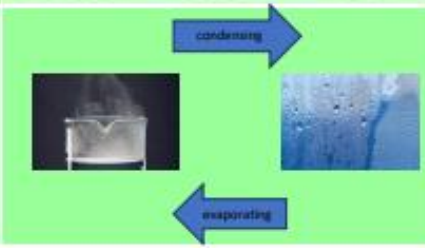
REMEMBER: Knowledge organisers are NOT a curriculum, they only summarise the sticky, most powerful knowledge that will be revisited again and again throughout a unit.

Changes of materials

Vocabulary	Definition
dissolve	A solid that completely mixes in a liquid.
soluble	Solids that dissolve in liquids, so that you can no longer see any bits.
solution	A mixture of a liquid with a dissolved solid.
insoluble	Solids that do not dissolve in liquid.
filter	Separates an insoluble solid that is mixed in a liquid.
evaporation	Separates a soluble solid and a liquid.
reversible change	Changes that are not permanent and can be switched back, eg dissolving, melting, freezing.
non-reversible change	Changes that cannot be reversed back to their original state. E.g. burning, rusting.

Non-reversible changes	These result in the formation of new materials
Burning	
Rusting	
Mixing vinegar and bicarbonate of soda	

Separating materials	Reversing the process to get back the original materials.
Filtering separates insoluble solids from liquids.	
Evaporating separates soluble solids from liquids.	

Reversible changes	These changes are not permanent.
Dissolving sugar in water to make a solution.	
	

Planning Format

Crossdale Unit Planning Overview: Science

Big Idea:

Prior Learning				Misconceptions (review 'Reach Out CPD' plus 'Plan')		
Enquiry question	Retrieval activity	Teacher Input (direct teaching) plus include a misconception question in red	Activities (modelling and scaffolding)	Key Vocabulary	Pupil Activity /Evidence in books	K2L and Working Scientifically focus