Curriculum approach:

Being a Scientist is integrated into our curriculum through an enquiry-led, local learning approach. This approach recognises that the cognitive maturity of learners affects what and how they learn. It encourages learners to be a scientist and develop their disciplinary knowledge as well as their substantive knowledge of scientific concepts.

The children learn through knowledge practice and retrieval and through a range of enquiry approaches covering all the skills needed to become a scientist.

What do we learn?

Our science curriculum is designed to build upon previous learning as the learners mature and become more able to understand a world further and further removed from their immediate surroundings. For example in Year 1, the children will learn about materials suitable for creating a toy, in Year 2 they will be looking into the materials needed to build a school and by Year 5 they will be thinking about what material an explorer will need to provide warmth, shelter and protection in some of the most hostile environments in the world.

Our knowledge organisers have been designed to show this progression to the children with previous knowledge displayed alongside the new knowledge they will learn in their enquiry. We have been careful to make these knowledge organisers as pictorial as possible to aid those learners who have barriers to reading. The knowledge organisers are downloadable for parents (at the bottom of this page) and are labelled by year group and area of study.

Curriculum approach:

Being a Scientist is integrated into our curriculum through an enquiry-led, local learning approach. This approach recognises that the cognitive maturity of learners affects what and how they learn. It encourages learners to be a scientist and develop their disciplinary knowledge as well as their substantive knowledge of scientific concepts.

The children learn through knowledge practice and retrieval and through a range of enquiry approaches covering all the skills needed to become a scientist.

What do we learn?

Our science curriculum is designed to build upon previous learning as the learners mature and become more able to understand a world further and further removed from their immediate surroundings. For example in Year 1, the children will learn about materials suitable for creating a toy, in Year 2 they will be looking into the materials needed to build a school and by Year 5 they will be thinking about what material an explorer will need to provide warmth, shelter and protection in some of the most hostile environments in the world.

Our knowledge organisers have been designed to show this progression to the children with previous knowledge displayed alongside the new knowledge they will learn in their enquiry. We have been careful to make these knowledge organisers as pictorial as possible to aid those learners who have barriers to reading. The knowledge organisers are downloadable for parents (at the bottom of this page) and are labelled by year group and area of study.

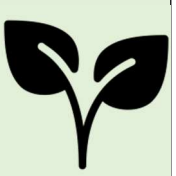
Being a Scientist Teaching and Learning Approach:

-When being a Scientist, all lessons use PRR to ensure that learners have the required knowledge to progress in the lesson.

-Vocabulary is taught explicitly one word at time. It is also important to teach the precise vocabulary needed to understand scientific concepts, especially as many words have a very specific scientific meaning and also a more common use. For example, freezing for a scientist means turning from a liquid to a solid but saying “brrr, I’m freezing” in everyday life just means “I’m cold”.

-Being a Scientist is assessed through responsive teaching, whiteboard work (including PRR, vocabulary key knowledge), correcting misconceptions in the moment, carousel quizzes and end of enquiry outcomes. -Reading comprehensions are used to allow for retrieval.

-Knowledge organisers are used to support home learning and inform parents and carers of the content covered as a historian. They provide standard definitions for vocabulary.

Scientist Subject Knowledge							
	Foundation Stage	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Plants: NC objectives 	**Plant definition-** living things that grow from the soil	identify and name a variety of common wild and garden plants - identify and describe the basic structure of a variety of common flowering plants, including trees, deciduous and evergreen. This links to seasonal enquiries to allow plenty of opportunities to observe changes and to see the difference between evergreen and deciduous.	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	- 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			Living things and their habitats - describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals - give reasons for classifying plants and animals based on specific characteristics.
Plants: language	Plant , Tree , Stem ,Leaf , flower, Petal ,grow ,Root , Soil, Seed ,Seedling , Garden Vegetables , fruit	**What grows near me?** Flower, petal, seed, fruit, leaf, leaves, stem, roots, trunk, bark, branch, tree	**How do plants grow near me?** **+ year 1 language** Light, water, warmth, temperature, **S**unlight, shade, seed, bulb, bud, vegetable, skin,	**How do plants die?** Pollinator, pollination, seed dispersal, nutrients, nectar, germination **+ year 1 and 2 language**			**How are adaptation and evolution linked?** Classify, characteristics, adaptations + Y 1, 2, 3 language. Children need to know some names of specific flowers e.g. common wildflowers and trees) in order to classify them.
Plants: key figures		Hamza Yassin					Darwin,
Plants: key Knowledge	Can you name some plants? What does a plant need to grow? What food can you get from plants?	Tree – a tall woody plant with a trunk. Flower – a small plant with colourful petals. **Plants have stems, leaves, flowers, fruit, roots.** **Plants grow from seeds.** **Trees have bark, a trunk, and branches.** An example of a tree/flower is .. Plants need soil, sun, and water to grow. Some parts grow above the ground, some grow underground. Evergreen trees keep their leaves all year round. Deciduous trees lose their leaves in winter and regrow them in spring.	**Fruits grow on trees and plants.** Fruits have seeds. **Plants have several parts – roots, stem, leaves, petals, buds.** Seeds and bulbs grow into new plants. Plants need light and water to grow well. Plants need warmth to grow.	**Stem – provides structure and transports water and nutrients to other parts of the plant.** **Roots draw up water and nutrients from the soil.** **Leaves turn sunlight into energy.** **Flowers attract pollinators (by making nectar which is food for pollinators)** A pollinator takes pollen from one flower to another which will then make a seed. Fruit – food for animals – makes them want to eat the seeds which disperses them. Germination – seeds start to grow into a plant. Leaves use light to make energy for the plant. Seeds travel in a variety of ways. Flowers produce nectar to attract pollinators (nectar is food for pollinators). **Plants need water and light to grow.**			Plants can be sorted into groups or classified using their characteristics. **Animals can be sorted into groups or classified using their characteristics.** **Living things have adaptations** that make them suited to their environment. **Evolution explains how characteristics change over time.** **Birds have evolved different beaks to allow them to eat certain foods to survive.** **Darwin studied the beaks of finches on the Galapagos islands.** Fossils provide information about animals that lived before.

				Plants need nutrients, space, and the right temperature to grow.			
Plants: Being a Scientist KS1: Observation, LKS2: Investigation UKS2: Experimentation	Explore plants in surroundings, dissecting leaves/petals what can you see inside, planting seeds into soil/cotton wool	**Observe** SQ How do plants grow? Plant and tend a vegetable garden in school grounds. **draw geraniums and other flowers.** Link to seasons in "what changes" to show that plants can look different at different times of the year.	**Observe/Simple investigation** SQ What do plants needs to grow? In the dark with water, inside with water, outside with shade and water, outside with sunlight and water . observe differences	**Investigation** SQ What are the requirements for growth? *too wet, with fertiliser, not enough space to grow, enough space, water and no extra nutrients (control)*			**Investigation** Use observation skills to compare various plants and group them together to classify them. Compare structures such as leaves. Do classifications change if we look at ability to flower (e.g grass and irises have similar leaves, grass doesn't flower). Which classification is better?

	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Y 5	Year 6
Animals (including humans): NC objectives  	**Farm** - A place to raise animals for food. **Wild** – something living in nature and not looked after by humans. **Nocturnal** – animals that are active at night. **Life-cycle** – the different stages of life for an animal.	identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals - identify and name a variety of common animals that are carnivores, herbivores and omnivores - describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets) - identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense	-notice that animals, including humans, have offspring which grow into adults find out about and describe the basic needs of animals, including humans, for survival (water, food and air) describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene	- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat; - identify that humans and some other animals have skeletons and muscles for support, protection and movement**.**	-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		- 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.
Animals (including humans): language	Animal names ,Food Chain Carnivore Herbivore Omnivore Lifecycle Cocoon Frogspawn Tadpole butterfly healthy unhealthy balanced diet active fit exercise muscles vitamins dentist teeth gums bacteria Body parts Senses Taste Smell Feel Touch	**What am I?** fish, amphibian, reptile, bird, mammal, carnivore, herbivore, omnivore, head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth, Animal features (e.g. wing, beak, claw, scales etc)	**What is home?** shelter, warmth, protection, survival, local animals (e.g. fox, cub, hedgehog, hoglet, thrush, chick etc) nocturnal, diurnal, nest, den, set, offspring, adult, **How do we live a healthy life?** Exercise, nutrition, health, survival, oxygen, herbivore, carnivore, omnivore, vegetarian, vitamins, carbohydrate, protein	**What's the difference between surviving and being healthy?** Skeleton, muscles, contracts, protein, carbohydrate, fats, nutrition	How can we eat healthily and sustainably? Digestive system, food chain, predator, producer, prey, mouth, teeth (canine, incisor, molar) tongue, oesophagus, stomach, small and large intestine, functions, carnivore, herbivore, omnivore, vegetarian, vegan,		**How are lives being saved?** Blood vessels, arteries, veins, red blood cells, white blood cells, platelets, clots, plasma, oxygenated, de-oxygenated, hidden sugars, diabetes, insulin, exercise, diet, circulatory system, heart-rate, pulse
Animals (including humans): key figures							Prof Sarah Gilbert

Animals (including humans): key Knowledge	Can you name these farm animals and match them to their young? Do you know any animals that live in the wild? Which wild animals live In the savannah /Arctic/woods? What does nocturnal mean? Name these nocturnal animals Sorting nocturnal animals and diurnal. The life cycle of a frog Compare frog to a life cycle of a butterfly. Which animals' habitat is water? How do animals breathe underwater? How are sea animals different to land animals? name different parts of a face. Do we all look the same? (describing and comparing) Name parts of your body What is touch? What is our sense of smell? What is sight? What is taste?	Use the correct vocabulary to name the main parts of the body. The five senses are sight, taste, smell, hearing, touch. Animals are grouped into fish, mammals, amphibians, reptiles, birds. A carnivore is an animal which eats other animals. A herbivore is an animal which eats plants. An omnivore eats plants and other animals. Fish have scales, breath underwater and lay eggs. Amphibians live on land and water, have moist skin and lay eggs. Birds have feathers, wings, beaks, and lay eggs. Reptiles have scales, lay eggs, breathe air. Mammals give birth to live young, make milk, have hair.	Living things need food, water and air to survive. They grow and eventually die. Non-living things do not grow or die. Animals have offspring that grow into adults. Living things live in habitats close to food, water and shelter. Animals are suited to their environment. Learners describe the lifecycle of one animal (frog) <u>How do we live a heathy life?</u> Describe what humans need to survive Explain the difference between things that are dead, living and never been alive Understand the importance of exercise and diet Explain a simple food chain	Humans and animals cannot produce their own nutrients. **Humans and animals need the correct nutrients to survive and be healthy.** Fats, sugar, carbohydrates and protein are types of nutrients. **The human skeleton is made of bone.** It helps to protect and move the body (only name skull, spine and rib cage) **Skeletons and muscles are for movement, protection and support.** Muscles are attached to bones and help them to move. When a muscle contracts, it gets shorter and so pulls on the bone it is attached to.	The digestive system helps break down food for the body to use. Stomach: stomach acid kills harmful bacteria. Small intestines: where food is broken down and nutrients are absorbed into the blood. Large intestines: where water is absorbed into the blood. Incisors help you bite off and chew pieces of food. Canine teeth are used for tearing and ripping food. Molars help you crush and grind food. A producer gets energy from sunlight. A consumer gets energy by eating plants or animals. A predator is an animal that eats other animals. The animals that are eaten are called prey. Predators are at the top of a food chain.		The circulatory system is made up of three parts: the heart, blood vessels and the blood itself. The heart keeps all the blood in your circulatory system flowing. The blood travels through a network of blood vessels to everywhere in your body. Blood vessels – tubes that move blood to and from your heart. Arteries – carry blood away from the heart, delivering oxygen and nutrients to cells. Veins – take blood back to the heart to get more oxygen. Red blood cells transport oxygen. White blood cells protect against infection. Platelets clot blood to repair cuts. Plasma is a liquid carrying these cells and nutrients. Exercise changes your heart rate to pump more blood to the muscles to give them more oxygen. The faster your heart beats, the quicker your pulse. Hidden sugars are ingredients in food and drink. Hidden sugars can be in ready-meals, drinks, and savoury food. Diabetes is a health issue that affects how the body uses sugar. There are two types of diabetes. Diabetes can be controlled by insulin or diet.
Animals: Being a Scientist KS1: Observation, LKS2: Investigation	Where does our food come from? Match food items to animals (milk, honey, meat)	Observe and compare physical attributes of different animals (mammals have fur, amphibians have damp skin, we both have 4	Children observe a microhabitat (minibeasts under a log). Question why these creatures are suited to this habitat. Sketch and label the	Children create models of Musculo-skeletal system to help them explain how we move. Learners investigate how they feel exercising at			Testing and recording pulse rate using stethoscopes and fingers, before and after exercise, record results, plot on bar graph (link to digital engineer using Excel).

UKS2: Experimentation	Use magnifying glass to look at each others teeth Sorting foods into healthy/unhealthy sorting objects into groups according to touch (smooth, furry, bumpy, rough, spiky) Smell pots – herbs/soaps etc.	limbs). Start to use this information to make predictions – if it doesn't have fur it might live in the water, it has big teeth it might be a carnivore)	minibeasts. Apply this questioning to images of creatures in other habitats. Children observe how their bodies react to different exercises – for example pulse changes, breathing.	different times of the day. Chn can start to record simple data (how many star jumps before lunch, how many after)			Use of bioview microscopes to look at blood cells

	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Habitats: NC objectives 			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 microhabitats describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.		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.	Living things and their habitats - Describe the differences in life cycles of a mammal, amphibian, an insect and a bird - Describe the life process of reproduction in some plants and animals	Living things and their habitats - describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals - give reasons for classifying plants and animals based on specific characteristics Evolution and inheritance - recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago - recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents - identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution - describe the ways in which nutrients and water are transported within animals, including humans
Habitats: language	Species Explore Woodland creatures Trees/leaves/flowers Growth Habitats – wild/captivity/farm Nocturnal Habitats – Den/Burrow/Nest		**What is home?** habitat, macro-habitat, (woods, park, fields, urban areas, city etc) micro-habitat, (stone, log, leaf litter, soil, pond etc), Global habitats (e.g. polar, dessert, ocean, grasslands, jungle) **What is home?** living, dead, never alive, food chain **How do we live a healthy life?** food chain		**What are we doing to save our seas?** Environnent, impact, endangered, species, habitat, pollution,	**How are we helping to save our planet?** life cycles, mammal, amphibian, insect, bird, reproduction, asexual, pollination, sustainability, pollution,	**How are adaptation and evolution linked?** Characteristics, micro-organism, invertebrates, vertebrates, amphibians, reptiles, birds, mammals, fish, evolution, inheritance, off-spring, adaptation, variation, species,
Habitats: key figures			Bird girl (Mya-Rose Craig) *British-Bangladeshi Female*		David Attenborough *White male*	Greta Thunberg *White fem neurodiverse*	Darwin, *white male*
Habitats: key Knowledge **All key knowledge on**	What is a forest/woods? What would you see at the woods?		Living things need food, water and air to survive. They grow and eventually die. Non-living things do not grow or die. Animals have offspring that grow into adults.		Animals can be sorted into groups or classified by looking at similarities and	Awareness that they are responsible for the planet All lifecycles begin with birth and	Plants can be sorted into groups or classified using their characteristics. Animals can be sorted into groups or classified using their characteristics. Evolution explains how characteristics change over time.

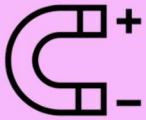
overviews. Need to copy across			Learners can describe the chosen animal's lifecycle. A habitat is the natural home of an animal or plant. Living things live in habitats close to food, water and shelter. Animals are suited to their environment. Name some animals that live in specific habitats.		differences between them A wetland is an environment that has land and water such as rivers, lakes, and ponds. Animals can be grouped by their characteristics. Name some common wetland wildlife. Classification keys group and sort animals by their characteristics. Recognise that environments can change and that this can sometimes pose dangers to living things	end with death. All involve growth and reproduction. Able to state differences in the lifecycle of mammal, bird, amphibian, insect. Able to state what defines each animal group. To be able to explain that an individuals actions have an effect	Living things have adaptations that make them suited to their environment. Birds have evolved different beaks to allow them to eat certain foods to survive. Darwin studied the beaks of finches on the Galapagos Living things have adaptations that make them suited to their environment. Fossils provide information about animals that lived before
Habitats: Being a Scientist KS1: Observation, LKS2: Investigation UKS2: Experimentation	exploring creatures living on school grounds, magnifying glasses, bug holders, Classifying insects/woodland animals Planting Explore our surroundings use magnify ing glasses-draw what we see/surveys/graphs-school field		Observing minibeasts in their habitats around school – what lives where?		Exploring simple classification keys to group organisms based on their appearance	Comparison of lifecycles across groups. Recording air pollution around the school at different times of day and different places. Link this to traffic levels and present findings	Exploring simple classification keys to group organisms based on their appearance building on Y4 learning to create more complex keys. Observations of plant structures and similarities and differences between plants. Experimenting with different "beaks" to see which have "evolved" to be better at picking up each food. Predicting which footprints are made in the right conditions to be fossilized.

	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Materials: NC objectives 		Everyday 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 simple physical properties	Everyday Materials - identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses - find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching			Properties and 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 - 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	
Materials: language	Float Sink	**What is my hat made of?** Compare and group, material, object, wood, plastic, glass, metal, water, rock, brick, paper, fabrics, elastic, foil. physical properties: hard/soft, stretchy/stiff, shiny/dull, rough/smooth, bendy/not bendy, waterproof / not waterproof, absorbent/not absorbent, opaque/transparent	**What could my 'classroom' be made of?** identify, compare, suitable/unsuitable, suitability, cardboard solid squashing, bending, twisting, stretching specific purpose + year 1 language especially absorbent/not absorbent, opaque/transparent			**How can science help explorers?** hardness, soluble/ solubility, transparent/ transparency, conduct, thermal conductivity, electrical conductivity dissolve, liquid, recover, substance, solution, mixture, separate filter, sieve, melt, evaporate, insulate change of state chemical change reversible change irreversible change burning, rusting, acid, bicarbonate of soda, polymer Hard, soft, strong, pliable, waterproof, porous, opaque, translucent, magnetic, metallic, plastic, stone, wood, fabric, natural, man-made + year 1 and 2	

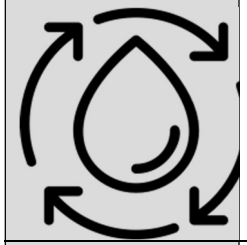
Materials: key figures							
Materials: key Knowledge		Material-what something is made from. Properties – how something feels and looks. Materials can be sorted by their properties. Materials share similarities and differences. Hard/soft, rough/smooth, heavy/light, shiny/dull Materials have different properties which can be used for a purpose.	Material-what something is made from. Properties – how something feels and looks. Materials can be sorted by their properties. Materials share similarities and differences. Hard/soft, rough/smooth, heavy/light, shiny/dull Materials have different properties which can be used for a specific purpose. *Glass is used for windows because it is transparent.* *Bricks are used for building because they are hard and durable.* Wool is used for jumpers because it is soft and flexible/warm. Metal is used for forks because it is easy to clean, hard-wearing etc The shape of some materials can be changed by squashing, twisting and stretching.			materials that are good in one scenario may not be the best in another or in real life where we have to compromise. Scientists and engineers have to come up with the best all-round solutions, which may not be perfect. Some materials are better at insulating than others. Solution= a mixture in which one material has dissolved in another. Not all materials dissolve. Materials that have dissolved are still there (just not visible) and can be extracted when the water evaporates. water can be cleaned by removing particles of varying sizes through a variety of filters Bacteria can still be present in filtered water. chemical changes can't be reversed Clues that chemical changes have occurred include: colour change, gases released (smells or bubbles) and heat being taken in or given out. Chemical change: A chemical change is any change where a new substance is formed. Reversible change: when materials can be changed back into how they were before the change took place.	
Seasons: Being a Scientist KS1: Observation, LKS2: Investigation UKS2: Experimentation	Test strength of different materials for a bridge Floating and sinking Predi ct and test Which container holds the most water? How do you know? Test	Observation of materials through sight (shiny, dull, colour, thickness) and touch (weight, warmth, texture, . Sorting these materials by these different observations. Where do children define the boundary between two categories (is corduroy a rough fabric or a smooth one?) Observing what happens when water is applied to define "waterproof"	observations of materials properties and sorting these materials by their suitability for different jobs. Observe that some materials are more malleable than others and can be forced into different shapes. Sorting materials by these properties			Creating a fair test – which variable should change, which should stay the same? Children to use thermometers to measure temperature changes between items wrapped in different insulators and record these figures on a table. Children to observe changes in soda bread that show a chemical change has taken place – bubbles & smell for a gas, colour change, heat taken in. Children to test whether a substance can dissolve (ext: observe with different temps of water), and observe that solute can come out of solution when solvent evaporates.	

	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Light: NC objectives 				Light - recognise that they need light in order to see things and that dark is the absence of light - notice that light is reflected from surfaces - recognise that light from the sun can be dangerous and that there are ways to protect their eyes - recognise that shadows are formed when the light from a light source is blocked by an opaque object - find patterns in the way that the size of shadows change			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
Light: language	sight optician			**Where does the darkness come from?** light, dark**,** absence, reflect, reflective, surface, shadow, light source, block, opaque			**Why are shadows important?** Year 3 plus: travel, cast (Periscopes, bending light through WW1 enquiry)
Light: key figures							
Light: key Knowledge	What does an optician do? How do glasses help some people see?			**Light always has a source.** **Light is needed to see things.** **Darkness is the absence of light.** **Reflect – the return of light from a surface.** When light hits a surface, light rays bounce off at different directions. Surfaces that best reflect light are smooth, shiny and flat. Different materials reflect light in different ways. Light from the sun can be dangerous. We can protect our eyes from the sun using sunglasses, etc Shadows are formed when opaque objects block a source of light. Opaque objects cannot be seen through. Shadows grow bigger and fuzzier as the opaque object moves closer to the surface it is being cast onto. Shadows grow smaller and sharper as the opaque object moves closer to the surface the shadow is being cast on.			**Light travels in straight lines.** Objects can be seen because they give off or reflect light. Shadows have the same shape as the objects that cast them because light travels in straight lines.
Light: Being a Scientist KS1: Observation, LKS2: Investigation UKS2: Experimentation				<u>Investigation</u> SQ Which surfaces reflect light best? Use data loggers to measure 'lux'			Recognise that light appears to travel in straight lines through investigation opportunities. Using CDs/mirrors and torches show when light can pass through the holes, changing the angle of the torch/alignment of CDs mirrors. Comparing translucency of materials using fair tests and record in a table. (DO our data loggers have the capacity to measure lux?)

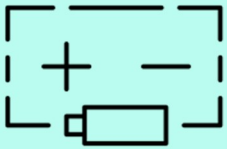
	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Seasonal changes: NC objectives 		observe changes across the 4 seasons - observe and describe weather associated with the seasons and how day length varies					
Seasonal Changes: language	Season Harvest foods Autumn Spring Winter summer hibernation	**How does my city change?** Seasons, Spring, Summer, Autumn, Winter, change, day, month, year, length, weather					
Seasonal change: key figures							
Seasonal changes: key Knowledge	name months of the year What is autumn? Spring/summer/winter What happens to the trees in different seasons? What does hibernation mean? Which animals hibernate?	**Name the 4 seasons** · **Describe the weather in each season** · Comment on day length in each season					
Seasons: Being a Scientist KS1: Observation, LKS2: Investigation UKS2: Experimentation		Observations of day length, weather, stages of plant life. Simple recordings of these observations.					

	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Forces & magnetism: NC objectives 				Forces and magnets - compare how things move on different surfaces - notice that some forces need contact between 2 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 2 poles - predict whether 2 magnets will attract or repel each other depending on which poles are facing.		Forces - explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. - identify the effects of air resistance, water resistance and friction, that act between moving surfaces - recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.	
Forces and Magnetism: language				**How can you feel the force?** Properties, surfaces, forces, magnetic, magnet, magnetism, distance, attract & repel, compare, group, poles (North and South), materials: steel, aluminium, tin, metallic, contact, types of magnet: bar, ring, button, horseshoe, pushing, pulling, friction, strength		**What does the Earth look like from the solar system?** Gravity, Earth, **What do forces actually do?** air resistance, water resistance, mechanisms, levers pulleys, gears, faster, slower, movements **How can science help the vulnerable?** magnetic	
Forces and Magnetism: key figures						Galileo Galilei, Isaac Newton	
Forces and Magnetism: key Knowledge	Aerodynamic Fast slow			Magnetism is an **invisible force**. **A magnet attracts or repels certain materials.** **Magnetism can occur over a distance.** Some metals are magnetic, such as iron. Some metals are not magnetic, such as aluminium. Some magnets attract more strongly than others. Magnets have two poles called north and south. North repels North, south repels south. Opposite poles attract. **Friction is a force between two surfaces that are sliding, or trying to slide, across each other**.		There are different forces, for example, friction, air resistance, water resistance, gravity. Explain the effect (air resistance/water resistance or friction) can have on a moving object. **Levers, pulleys and gears allow a smaller force to have greater effect.**	
Forces: Being a Scientist KS1: Observation, LKS2: Investigation	Cars/ramps experiment distance/speed Predict and reason			<u>Investigation</u> SQ What surface makes a car travel the slowest?		<u>Experiment</u> SQ How do pulleys and levels affect effort?	

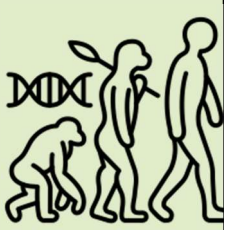
	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Rocks: NC objectives 				- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties - describe in simple terms how fossils are formed (when things that have lived are trapped within rock) - recognise that soils are made from rocks and organic matter.			*Recap Y3 fossil formation in order to understand how we can use this evidence to show evolution*
Rocks: language				**What is underneath our feet?** Fossils, soil, organic matter, formation, react, grains, crystals, metamorphic, igneous, sedimentary, loam, clay, sand, properties, appearance, particles			**Linnaeus and Darwin – How are they connected?** Fossil Sediment Palaeontologist Impression fossil Archaeopteryx Evidence
Rocks: Key figures							Mary Anning *white female*
Rocks: key knowledge				Name 3 different types of rock and describe their properties Group rocks together basic on properties and appearance Describe in simple terms how fossils are made Soils are made from rocks and organic matter			Fossils show animals and plants that lived long ago. Fossils give evidence to scientists and historians about the past. Fossils form when organisms are buried in sediment, mineralize, and are preserved over millions of years.
Rocks: Being a Scientist KS1: Observation, LKS2: Investigation UKS2: Experimentation				**Subjecting rocks to different tests –look and see, touch and feel, streak test using ceramic tiles, magnetic test, UV light test to see their glow**			*SEE PLANTS PROGRESSION*

	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
States of matter: NC objectives 					States of matter - compare and group materials together, according to whether they are solids, liquids or gases; - observe that some materials change state when they are heated or cooled, (and measure or research the temperature at which this happens in degrees Celsius (°C)) - identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.		
States of Matter: language					**Where does our water come from?** Solid, liquid, gas, state, heated, cooled, melted, measure, degree Celsius, temperature, Water cycle: evaporation, condensation, precipitation, ground water, substance.		
States of matter: key figures							
States of matter: key knowledge					- Gases do not hold their shape and fill any container or space they are in. - Solids have a fixed shape. - Liquids take the shape of their container. - Identify if a material is solid, liquid or gas (and give 3 examples of common solid liquids and gases) - Some solids change state when heated e.g. chocolate melts - Some liquids change state when cooled or heated e.g. freezing and boiling - Some changes are reversible Links with Geographer - *Water cycle – continuous movement of water within the Earth and atmosphere. Water is recycled over and over again.* - *Evaporation – sun heats water, turning it to water vapour (gas)* - *Condensation – water vapour cools, turning into water droplets forming clouds* - *Precipitation – water falls back to ground in form of rain, sleet or snow* - *Accumulation – water runs over land collecting in lakes and river, running back to the sea*		
States of matter: Being a Scientist KS1: Observation, LKS2: Investigation UKS2: Experimentation					Investigating the properties of the states of matter through exploration. Classify states of matter by properties. Set up miniature water cycle investigation inside plastic bags – place in different areas of the room to show that the sun causes evaporation		

	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Sound: NC objectives 					Sound - identify how sounds are made, associating some of them with something vibrating - recognise that vibrations from sounds travel through a medium to the ear - find patterns between the pitch of a sound and features of the object that produced it - find patterns between the volume of a sound and the strength of the vibrations that produced it - recognise that sounds get fainter as the distance from the sound source increases		
Sound: language	hearing sound				**What is sound?** Sounds, noise, vibrating/vibrations, pitch, volume, strength, patterns, fainter, louder, quieter, increase, insulation.		
Sound: key figures					Evelyn Glennie *(hearing impaired)*		
Sound: key Knowledge	What is hearing?				- Sound is made by vibrations - vibrations cause sound waves - sound travels through objects, water, and air - sound waves travel into the ear - The volume of a sound is how loud or quiet the sound is. - The louder the sound, the stronger the vibration - Sound gets fainter as the distance from the sound source increases - Sounds can be different pitches - High pitch=faster vibration - Volume of air changes the pitch		
Sound: Being a Scientist KS1: Observation, LKS2: Investigation UKS2: Experimentation					Using balloons, string can telephones investigate how sound travels through a medium and that sound get fainter the further you are from the source. Investigation using tuning forks to explore size of vibrations. Explore which materials are the best conductors of sound. Recording observations through carroll diagrams. Investigate how the changes in volume of air will change pitch (xylophone water jars)		

	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Electricity: NC objectives 					Electricity: - identify common appliances that run on electricity - construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers - identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery - recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit - recognise some common conductors and insulators, and associate metals with being good conductors		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.
Electricity: language					**How can we switch off?** Circuit, cells, battery, wire, bulbs, switches, buzzer, lamp, appliance, loop, series circuit, open/closed circuit, motor, conductors, insulators, devices, symbols, precautions.		**What is Net zero?** Brightness, voltage, variations, components, systematically.
Electricity: key figures							
Electricity: key Knowledge					Many appliances run on electricity, such as, … A circuit is made of several components and must have a power source. Parts of a circuit can include wires, bulbs, buzzers, switches. A switch opens and closes a circuit. Electricity cannot flow if the circuit is broken. Conductors allow electricity to flow around a circuit. Metals are good conductors of electricity. Insulators do not allow electricity to flow. Rubber, plastic, and wood are good insulators. Metals are good conductors, for example, aluminium, copper (paper clips, foil, wire, split pins) A fair test is a test that controls all but one variable when attempting to answer a scientific question.		The brightness of a bulb will change depending on how many bulbs or cells are in the circuit. The loudness of a buzzer will change depending on how many buzzers or cells are in the circuit. Symbols can be used to represent components. A switch opens and closes a circuit.
Electricity: Being a Scientist: KS1: Observation, LKS2: Investigation UKS2: Experimentation					**Investigation** SQ Do all materials conduct electricity? - I can carry out a fair test and talk about my observations and use these to draw conclusions. - I can work scientifically by observing patterns.		**Setting up fair tests and observing patterns**

	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Earth and Space: NC objectives 						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	
Earth and Space: language						**What does the Earth look like from the solar system?** Earth, planet, sun, solar system, moon, spherical, rotation, star, names of 8 planets, dwarf planet, orbit, atmosphere, gravity	
Earth and Space: Key figures						Hannah Wakeford *white female*, Katherine Johnson *black female*, Chris Hadfield, *white male*, Galileo *white male,* Neil Armstrong and Buzz Aldrin *white male,* Tim Peake *white male,* Maggie Aderin-Pocock *black female*	
Earth and Space: key Knowledge						**- Name the planets in the solar system** **· Describe the movement of the earth and other planets relative to the sun** **· Describe that the earth, sun and moon are approximately spherical bodies** · Explain day and night and the apparent movement of the sun across the sky using the idea of the Earth's rotation	
Earth and Space: Being a Scientist KS1: Observation, LKS2: Investigation UKS2: Experimentation						Create a human sundial – record where the shadows fall and their length. Predict how this will change throughout the day.	

	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Evolution: NC objectives 							Evolution and inheritance - recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago - recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents - identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution
Evolution: language **Year 6 – building on from Year 3 – fossils. Links to animals and habitat**							**How are evolution and adaptation linked?** Fossils, inhabited, evolve/evolved, offspring, vary/variation, adapt, adaptation, environment, characteristics, change, palaeontologist, advantage/ disadvantage.
Evolution: key figures							Mary Anning *white female*, Charles Darwin *white male*, Alfred Wallace *white male*
Evolution: key Knowledge							Fossils provide information about animals that lived before Plants can be sorted into groups or classified using their characteristics. Animals can be sorted into groups or classified using their characteristics. Evolution explains how characteristics change over time. Living things have adaptations that make them suited to their environment. Birds have evolved different beaks to allow them to eat certain foods to survive. Darwin studied the beaks of finches on the Galapagos Living things have adaptations that make them suited to their environment.
Evolution: Being a Scientist KS1: Observation, LKS2: Investigation UKS2: Experimentation							Using various tools to mimic beaks to see how birds have adapted.

Working Scientifically – Disciplinary							
		Observation		Investigation		Experimentation	
	Foundation Stage	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Asking Questions   		asking simple questions and recognising that they can be answered in different ways		asking relevant questions and using different types of scientific enquiries to answer them		planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	
		question predict				hypothesis variables control	
Measuring and Recording   		observing closely, using simple equipment performing simple tests identifying and classifying gathering and recording data to help in answering questions		setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers 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		taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs using test results to make predictions to set up further comparative and fair tests Precision and accuracy when recording as a scientist, using blank paper, graph paper,	

		observe compare sort group chart/table measurements equipment test data record	fair test classify key equipment units diagram bar chart	accuracy precision repeat readings classification keys
Concluding and Evaluating  		using their observations to suggest answers to questions	reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions	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 Identifying scientific evidence that has been used to support or refute ideas or arguments.
		conclusion	patterns relationships analyse changes similarities differences evidence sources	trust scientific evidence support refute secondary sources scatter graphs line graphs comparisons causal relationships