Knowledge - Science

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Working scientifically	•Know that you need to ask questions to be scientists. •Know how to perform simple tests.	•To know that exercise makes our heart pump faster. •Predict what will happen before during after exercise. •Know how to measure acurately and record the information. •To know how to perform a fair test. •To know how to record results from an investigation. •To know that a seed grows into a plant and recognise that it	•Rocks •Identifying, grouping and classifying, comparative and fair testing •To look at the appearance of rocks and their texture to group them together. •Through sequencing how fossils are formed. See Block 3 how fossils are formed. •To gather samples of soil and look closely using magnifying glasses, create a Pic Collage showing photo of soil and adding labels to name	•To accurately use a thermometer to measure temperature. •-To know how to use a data logger to measure temperature and decibels. •-To record findings in a table. •-To accurately measure liquid using ml. •-To understand the process of setting up a fair test. •To plan investigations to answer scientific questions. •Know how to work scientifically	•Know how to plan different types of enquires. •Know how to read, spell and pronounce vocabulary accuratly. •Know how to report and present findings from enquiries. •Know how to explain casual relationships during an observation. •Know how to control the temperature of ice during an experiment. •Know how to record data on a	•Know that a fair test is ensuring that all the variables stay the same apart from the one variable that is being measured. •Know that tea does not dissoolve but colours and flavours the water it is in. •Know that a fair test is ensuring that all the variables stay the same apart from the one variable that is being measured. •Light is a form of energy that travels in a wave from a source.

Knowledge - Science

		• needs a balance of water and sunlight. • To know that a predicition is an edcuated guess and be able to make a sensible prediction based on prior knowledge.	• what they see in it. To add labels to their diagram showing that soil is made up of air, water, minerals (broken down rocks) and organic matter (living and dying plants and animals). • To know that soil can be permeable and impermeable. To compare different soil samples. • Animals, including humans. • Research, identify, classifying and grouping, pattern seeking • Marketplace activity to why they	• by asking relevant questions. • -Know what is a fair test • -Know how to present data and record in simple scientific language. • -Know how to draw simple conclusions, use evidence to support findings. • -to set up careful investigations and understand how to make it a fair test. • -To understand the need for accurate observations. • Know how to plan different types of enquires. • Know how to read, spell and pronounce	• table and line graph. • Know how to use evidence to support reversable and irreverable changes. • Know how to measure accuratly using a Newton metre. • Know how to test and conclude how an object moves through the air. • Know how to control variables. • Know how to read, spell and pronounce 'Space' and 'Working Scientifically' vocabulary using a dictionary.	• A light source is an object that makes its own light. • Reflection is when light bounces off a surface, changing the direction of a ray of light. • An incident ray is a ray of light that hits a surface. • A reflected ray is a ray of light that has bounced back after hitting a surface. • The law of reflection is the law that states that the angle of the incident ray is equal to the angle of the reflected ray. • We need light to be able to see things. Light waves travel

Knowledge - Science

			are important to humans. • To use endoskeleton (internal), exoskeleton (external) and hydroskeleton (no bones, water) to classify and group animals. • research the different food groups and why they are important to humans. • To use endoskeleton (internal), exoskeleton (external) and hydroskeleton (no bones, water) to classify and group animals.	vocabulary accuratly. • Know how to report and present findings from enquiries. • Know how to explain casual relationships during an observation. • Know how to control the temperature of ice during an experiment. Know how to record data on a • table and line graph. • Know how to use evidence to support reversable and irreverable changes.	• Know how to create a diagram of how the earth, moon and sun are related to each other. • Know how to plot different weather temperatures on a line graph. • Know the different phases of the moon and present these findings in a range of ways. • Know how to investigate the size of a creator. • Know how the gravitational pull of the moon, impacts the tides. Know that seasons occur by the	out from sources of light in straight lines. These lines are often called rays or beams of light. • Light travels as a wave. But unlike waves of water or sound waves, it does not need a medium to travel through. This means light can travel through a vacuum - a completely airless space. Isaac Newton shone a light through a • transparent prism, separating out light into the colours of the rainbow (red, orange, yellow,

Knowledge - Science

			To choose a question – Am I / you a square? Do taller children have longer arms/ bigger feet? To use measurnig skills accurately to investigaate and answer question • Light • Explore how different objects are more or less visible in different levels of lighting. • Explore how objects with different surfaces, e.g. shiny vs matt, are more or less visible. • Explore how shadows vary as the distance between a light source and an	• Know how to measure accuratly using a Newton metre. • Know how to test and conclude how an object moves through the air. • Know how to control variables. • environment is best suited.	• movement and tilt of the earth. • Know how to measure a shadows length using centimetres and metres. • Know how to explain the process of photosynthesis by counting bubbles using water, a heat source and varied distance. • Know how to conduct an enquiry- growing beans in a bag. Know how to plan different sceintific enquires- change variables for the beans to see which	green, blue, indigo and violet) - the colours of the spectrum. All the colours together merge and make visible light. A shadow is always the same shape as the object that casts it. This is because when an opaque object is in the path of light travelling from a light source, it will block the light rays that hit it, • transparent prism, separating out light into the colours of the rainbow (red, orange, yellow, green, blue, indigo and violet) - the colours of the

			object or surface is changed. Explore shadows which are connected to and disconnected from the object e.g. shadows of • clouds and children in the playground. • Choose suitable materials to make shadow puppets. • Create artwork using shadows. • Evidence opportunities • Can describe patterns in visibility of different objects in different lighting conditions and predict which will be more or less visible as conditions change			spectrum. All the colours together merge and make visible light. A shadow is always the same shape as the object that casts it. This is because when an opaque object is in the path of light travelling from a light source, it will block the light rays that hit it, • while the rest of the light can continue travelling

Knowledge - Science

			Can clearly explain, giving examples, that • objects are not visible in complete darkness • Can describe and demonstrate how shadows are formed by blocking light • Can describe, demonstrate and make predictions about patterns in how shadows vary • Forces and Magnets Carry out investigations to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, • clockwork toys, soles of shoes etc.			

			• Explore what materials are attracted to a magnet. • Classify materials according to whether they are magnetic. • Explore the way that magnets behave in relation to each other. • Use a marked magnet to find the unmarked poles on other types of magnets. Explore how magnets work at a distance e.g. through the table, in water, jumping • paper clips up off the table.			

			• Devise an investigation to test the strength of magnets. • Evidence Opportunities • Can use their results to describe how objects move on different surfaces • Can use their results to make predictions for further tests e.g. it will spin for longer on this surface than that, but not as long as it spun on that surface Can use classification • evidence to identify that some metals, but not all, are magnetic			

			• Through their exploration, they can show how like poles repel and unlike poles attract, and name unmarked poles • Can use test data to rank magnets • Observe what happens to plants over time when the leaves or roots are removed. • Observe the effect of putting cut white carnations or celery in coloured water. Investigate what happens to plants • when they are put in different conditions e.g. in darkness, in the cold, deprived of			

			air, different types of soil, different fertilisers, varying amount of space. • Observe flowers carefully to identify the pollen. • Observe flowers being visited by pollinators e.g. bees and butterflies in the summer. • Observe seeds being blown from the trees e.g. sycamore seeds • Research different types of seed dispersal. • Classify seeds in a range of ways, including by how they are dispersed.			

Knowledge - Science

			• Evidence opportunities • Can explain observations made during investigations • Can look at the features of seeds to decide on their method of dispersal • • Can draw and label a diagram of their created flowering plant to • show its parts, their role and the method of pollination and seed dispersal			

Knowledge - Science

Plants	• Know what plants need in order to grow – water, light , food • Know the parts of a plant, stem,roots, flower • Know that plants spread seeds to reproduce. • Know the difference between evergreen and deciduous trees.	• Children know through observing a variety of pictures that things can be classified as living, dead or never alive. • To know that a habitat is where an animal lives and all animals require different habitats to survive. • Begin to name a variety of plants and know a range of animals and what habitats they have. • To know where animals get their food from and understand that some animals need a varied diet.	• Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce the plant's food. Some plants			

Knowledge - Science

		• Know the terms <u>omnivore, herbivore and carnivore</u> and be able to explain and give examples of each • To know that a seed grows into a plant and recognise that it needs a balance of water and sunlight. • To know that a predicition is an edcuated guess and be able to make a sensible prediction based on prior knowledge.	produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth			

Knowledge - Science

Animals, including humans	•Know the names of the five senses and the body part associated •Know the differences between a bird, mammal,reptiles, fish, amphibians. •Know the names of some insects. •Know that animals can be carnivores, herbivores or omnivores	•Naming babies including •Puppy kitten lamb calf gosling snakelet piglet foal tadpole owlet. •Lifecycle of a frog •Lifecycle of a butterfly •Lifecycle of a sheep •Lifecycle of a human •To know basic needs – water,food, air & shelter. •Know what is in the food groups, dairy, protein, fruit/veg fats sugars.	•Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients. •Humans, and some other animals, have skeletons and muscles which help them move and	•-Know the functions and parts of the digestive system. •-Know the function of each organ of the digestive system. •-Know the types of teeth in humans (canine,pre molars, incisors & molars). •-Know the function of the types of teeth. •-Know that our choice of drink can effect our teeth in a negative way. •-To construct a food chain using given criteria e.g. a food chain from the sea. •-To describe the terms producer, consumer, predator and prey?	•Know the stages of a human lifecycle. •Know the importance of good hygiene. •Know and describe the main changes of puberty for males and females. •Know that a period (menstruation) happens every month (once an egg is released) if it is not fertilised by the sperm, a period occurs. •Know how reproduction happens (a sperm and an egg come together) this is	•Know that the skeleton protects our organs as well as keeping us stable. •Know that the organs carry out the systems and processes to keep our bodies alive. •Know that muscles allow us to move. •Know the circulatory system is the process of blood, oxygen and nutrients being carried around the body to the heart and muscles. •Know that the job of the heart is to pump blood around our bodies.

Knowledge - Science

	and what they eat •Know what a pet needs- water, food, home		provide protection and support	•-To describe the terms, carnivore, herbivore and omnivore placing these in the correct place in a food chain.	fertilisation, then a baby is made. •Know the different stages of pregnancy •Know that MRS NERG stands for: movement, respiration, sensitivity, nutrition, energy, reproduction, growth	•Know that oxygenated blood is carried to all parts of the bodies through arteries. At a muscle the oxygen and nutrients pass through capillaries which pass back any waste e.g. carbon dioxide. •Know that veins take de-oxygenated blood and waste to the heart, which is then pumped to the lungs to become oxygenated again.# •Know there are 4 chambers in the heart, (Left atrium and ventricle and right atrium and ventricle).

Knowledge - Science

						• Know that blood vessels include veins, arteries and capillaries. • Know that the heart is classed as an organ but it is a muscle. • Know that the pulse rate is how often blood is pumped around your body and is measured in bpm (beats per minute) • Know that the pulse rate is measured by counting the pulse in 30 seconds and doubling it. • Know that exercise increases pulse rate because the body needs to get oxygen quickly to the

Knowledge - Science

						muscles that are being used. •Know the 5 main food groups: protein, dairy, carbohydrates, fruit/vegetables, fats/sugars. •Know which types of foods are put into these categories. •Know that exercise is about keeping your body fit and healthy (not just about size) •Know that exercise causes your muscles (including heart) to work harder.

Knowledge - Science

						• Know that exercise makes you breathe faster. • Know that muscles need to warm up so they are not stretched too far and that they are cooled down to remove excess lactic acid which can cause pain and discomfort. • Know that drugs are substances which have an effect on the body and its functions. • Know that drugs include medicines which should only be given by a trusted adult. • Know that some drugs are illegal as

						they have severely negative impacts on the body (including addiction) • Know that cigarettes and coffee contain drugs. • Know the short term (stained fingers and teeth, smell of smoke etc.) and long term effects of smoking (lung damage, risk of heart disease, addiction, chronic coughing, change to voice) • Know the short term (lack of bodily control, memory loss, hangover, headaches, slurred speech, weaker

Knowledge - Science

						vision) and long term effects (liver damage, addiction, strong change in behaviour) of drinking alcohol.

Knowledge - Science

Everyday materials	• Know the names of common materials, wood, metal, glass, plastic, rock. • Know which of these materials are waterproof. • Know which of these materials are suitable for different jobs	• To know the names of different materials. • To understand the uses of different materials. • To name some different uses of a variety of materials. • To match up a material with a variety of objects. • To recognise which materials are strong/durable. • To understand the properties of different materials. • To know which materials will be most suitable for particular jobs.				

Knowledge - Science

Seasonal changes	• Know Spring, Summer, Autumn and Winter and the type of weather. • Know how the length of day varies.					

Knowledge - Science

Living things and their habitats				•-To know the term vertebrate and invertebrate. - To classify our woodland invertebrates into molluscs, arachnids, insects, crustaceans, annelids & myriapods. •-To be able to group vertebrates into mammals, reptiles, amphibians, birds & fish. •-To be able to construct a branching data base to classify vertebrates. •-To describe what a habitat has to	•Know what classifies animals: •mammals (warm blooded/hair/ gives birth to live young •reptile (dry scaly skin/ lays eggs) •amphibian (live in both water and land) •fish (fins/ lives underwater) *birds (warm blooded/ covered in feathers) •Know that a plant is made up of a: flower, stem, leaf and roots. •Know that inside a flower, it is made up of: pollen, anther, filaments,	•Know that adaptation is the process of animals changing their bodies over time in order to live in their environment. •Know that adaptations over generations can become evolution. •Know living things are separated into plants, animals and micro-organisms. •Know animals are then separated into vertebrae and invertebrae. •Know that invertebrae are also classified into groups based on their bodies, legs and shells.

Knowledge - Science

				contain to allow an animal to survive. - To name the different habitats we might find around our school, noting types of animals and how it provides shelter, food & water. •- •-To understand how habitats can change negatively or positively. •-to understand how habitats can be effected by humans [litter, chemical pollution, oil spills, deforestation, urban development, global changes,]	sepal, ovule, ovary, style, stigma. •Know that stamen is male and carpel is female. •Know that seed dispersal is how more plants are made. •Know that germination is the development of a plant from a seed. •Know that pollination is when pollen is moved from a stamen to a stigma to move pollen. •Know that fertilisation is where pollen moves down the stigma into the	(molluscs, crustaceans, insects and arachnids) •Know the key characteristic of the 5 animal groups: •Mammals: give birth to live young, feed milk to their young, have fur, warm blooded •Reptiles: cold blooded, lay eggs, scales •Amphibians: live in both water and land, lay eggs. •Birds: have feathers, not teeth, have a beak, lay eggs, wings (but not all fly) •Fish: live in water, gills to breathe, lay eggs, scales.

Knowledge - Science

				• -To know how palm oil can effect deforestation and loss of habitat for orang-utans. • -To know some of the products that contain palm oil.	ovary and makes a seed. • Know that photosynthesis is the process that plants go through to make food by using sunlight and chlorophyll to turn water and carbon dioxide into nutrients.	• Know there are variations within species of animals and that this is a result of adaptation.

Knowledge - Science

ROCKS			• Rock is a naturally occurring material which can be sorted into igneous, sedimentary or metamorphic. There are different types of rock e.g. sandstone, limestone, slate, granite etc. which have different properties. See Rocks and soil fact sheet to support knowledge of different rocks. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones,			

			pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. • Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal			

Knowledge - Science

			and plant matter is replaced by minerals from the water			

Knowledge - Science

LIGHT			• We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective. • The light from the sun can damage our eyes and therefore we should not look directly at the sun			• Know that light travels in straight lines. • Know that we see light because light travels from a light source and then bounces off an object and into our eyes. • Know that light is made up of all colours of the spectrum. • Reflection is when light bounces off a surface in a different direction • Rays of light obey the law of reflection: The angle of incidence (original light beam from light source)

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Knowledge - Science

			and can protect our eyes by wearing sunglasses or sunhats in bright light. • Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface.			always equals the angle of reflection. • Light is a form of energy that travels in a wave from a source. • A light source is an object that makes its own light. • Reflection is when light bounces off a surface, changing the direction of a ray of light. • An incident ray is a ray of light that hits a surface. • A reflected ray is a ray of light that has bounced back after hitting a surface. • The law of reflection is the law that states that the angle of the

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Knowledge - Science

						incident ray is equal to the angle of the reflected ray. • We need light to be able to see things. Light waves travel out from sources of light in straight lines. These lines are often called rays or beams of light. • Light travels as a wave. But unlike waves of water or sound waves, it does not need a medium to travel through. This means light can travel through a vacuum - a completely airless space.

Knowledge - Science

						• Isaac Newton shone a light through a transparent prism, separating out light into the colours of the rainbow (red, orange, yellow, green, blue, indigo and violet) - the colours of the spectrum. All the colours together merge and make visible light. • A shadow is always the same shape as the object that casts it. This is because when an opaque object is in the path of light travelling from a light source, it will block the light rays that hit it, while the

Knowledge - Science

						rest of the light can continue travelling

Knowledge - Science

FORCES and MAGNETS			• A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes. • A magnet is any object that creates a magnetic field and it attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. The strongest parts of a		• Know that gravity is a force that attracts an object to the earth. • Know that air resistance is when a force is acting on a moving object. • Know that friction is a firce between two forces. • Know that water resistance and upthrust are the forces acting upon an object in water. • Know that pulleys, levers and gears allow a smaller force to have greater effect.	

Knowledge - Science

			magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles, e.g. a north and south, are brought together they will pull together – attract			

Knowledge - Science

States of matter				• To observe that water as a solid will change when left at room temperature. • -The shape of the ice effects how quickly it melts. • -To be able to group materials into Solids, Liquids and Gases. • Understand that the molecules of Solids, liquids and Gases are different- Solids- Molecules closely packed. Liquids more fluid and move together, Gases – not closely packed able to move freely.		

Knowledge - Science

Electricity	•	•	•	•-Know what electricity is and why it is important in our lives. •-Know about common appliances that run on electricity. •-Know how to construct a simple circuit. •-Name cells, wires, bulbs, swtiches, buzzer. •-Know how to draw a pictorial representation of the circuit. •-To understand what a conductor and imnsulator are and know why we need this knowledge.	•	•Know the key components of a cicuit: wires, battery and something which will react e,g. light bublb/buzzer/motor •Know that a circuit must be complete for it to work. •Know that if an addition battery is added then the bulb will be brighter whereas if an additional bulb is added instead they will both be weaker. •Know that in a diagram of a circuit, wires are drawn as straight lines and other components

Knowledge - Science

				• -Know and name some common conductors and insulators. - To know that the brightness of a lamp or the volume of a buzzer is associated with the number or voltage of cells. • -To recognize that a switch opens and closes a circuit. • -To know that when a switch is open the circuit is incomplete and that a closed switch allows the electricity to flow. • -To understand how a switch works and understand the use of a conductor		are represented using symbols. • Know the symbols for: open and closed switches, batteries, bulb, motor, buzzer, amp meter • Know that a conductor is a material which allows electricity to flow through e.g. metal. This is why the inside of wires are made of copper – it is flexible and a conductor • Know that insulators are materials which do not allow electiricity to pass thorugh e.g. rubber.

Knowledge - Science

				[metal] inside the switch.		This is why wubber is used on wires • Know that electicity comes from power stations (of different types), travels though wires and pylons to the grid, then to streets and their consumer boxes, then to a home's consumer box then spread to the different plug sockets or lights.

Knowledge - Science

Properties and changes of materials	•	•	•	•	• Know how compare and group everyday materials based on their properites. • Know that some materials will disolve in a liquid to form a solution. • Know how to descibe and recover a substance from a solution. • Know a reviersable change can be changed. • Know a irrervirasable change cannot be changed. • Know how to separate materials.	•

Knowledge - Science

					• Know how everyday materials can be used in an experiment for insulation. • Know how to use a thermometer. • Know how the properties of materials offer a different level of insulation.	

Knowledge - Science

Earth and space	•	•	•	•	• Know why the earth is a sphere. • Know that the Earth and planets make up our solar system. • Know a mnemonic to remember the name of each planet. • Know that the moon orbits the earth in 28 days. • Know that the earth orbits the sun in 365 days and is takes 24hours to spin on its axis. • Know that the sun is the centre of our solar system. • Know the relationship between the sun,	•

Knowledge - Science

					moon and earth in both size and distance. • Know that day and night is the cause of the earth rotating round the sun. • Know the moon reflects the sun. • Know that a shadow is formed when a direct light source is blocked by an opaque object.	

Knowledge - Science

Evolution and inheritance	•	•	•	•	•	• Know that evolution is a long-term process which is a result of animals changing to adapt to their habitats of generations. • Know that fossils are the result of a living organisms remains being left over time to be …mud… • Know that offspring is the term used for the results of reproduction. • Understand that variation is the word used for the sligh differences that occur between siblings or animals

Knowledge - Science

						of the same species. • Know that characteristics can be classified as inherited, environmental or both. • Inherited characteristics: natural hair colour, eye colour, skin colour, blood type etc. • Environmental characteristics: weight, skills, hair colour, religion etc.