# SCIENCE

## KEY STAGE ONE - YEAR A

| | AUTUMN 1 | AUTUMN 2 | SPRING 1 |
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| **Description** | Children will observe and learn about the season, autumn and winter, and the weather associated with them | Children will explore and name everyday objects. They will become familiar with the names and properties of different materials and they will compare and sort them according to their properties. | Children will be able to name and understand the difference between common wild and garden plants. They will know the basic structure of flowering plants and trees. They will learn about what a seed needs to grow, |
| **NC Objectives** | • Observe changes across the four seasons<br>• Observe and describe weather associated with the seasons and how the day length varies | • Distinguish between an object and the material from which it is made<br>• Identify and name a variety of everyday materials<br>• Describe the simple physical properties of a variety of everyday materials<br>• Compare and group together a variety of everyday materials based on their simple physical properties<br>• Identify and compare the suitability of a variety of everyday materials<br>• Find out how the shapes of solid objects made from some materials can be changed | • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees<br>• Identify and describe the basic structure of a variety of common flowering plants, including trees<br>• Observe and describe how seeds and bulbs grow into mature plants<br>• Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy |
| **Substantive Knowledge** | • There are four seasons, spring, summer, autumn and winter<br>• Each season is about three months long<br>• In autumn, the leaves fall off the trees and the amount of time we have in the day becomes less.<br>• Winter has the shortest amount of time during the day and the weather is at its coldest.<br>• Animals and plants have adapted ways of surviving the changing seasons, these include hibernating, storing food, fattening up, migration, loss of leaves<br>• Trees can be either evergreen or deciduous.<br>• Evergreen trees keep their green leaves all year round.<br>• Deciduous trees lose their leaves every autumn.<br>• In autumn and winter, the weather is usually colder, rainier but we still have sunny and warm days | • Know there is a difference between an object and the material it is made from.<br>• Know that there are many different materials that have different observable properties.<br>• Know that a property is what an object looks like, feels like and what it does, e.g. It is strong, it is rough.<br>• Name objects and then say what they are made of wood, plastic, glass, metal, water, rock, paper, cardboard, rubber, fabric.<br>• Know that different materials have different properties, such as: hard, soft, shiny, dull, stretchy, rough, smooth, bendy, not bendy, transparent, opaque, waterproof, not waterproof, absorbent, not absorbent, sharp, stiff.<br>• Know that many types of plastic are waterproof, that metal is usually strong, that rock is hard and rigid, some plastics are flexible,<br>• Know that materials can have useful properties that make them suitable for a given job (including being waterproof, flexible, rigid, opaque and transparent)<br>• Know that materials can be changed by physical force (twisting, bending, squashing and stretching).<br>• Know that applying forces (e.g. bending, stretching, squashing and twisting) to solid objects can change their shape<br>• Know the difference between opaque, transparent.<br>• Know rigid means something that will not bend without breaking<br>• Flexible is something that can bend without breaking | Wild and Garden Plants<br>• Wild plants can grow without care - dandelion, daisy, buttercup, clover, nettle, bramble, ivy, bluebells<br>• Garden plants need to be cared for - rose, tulip, sunflower, carnation, lavender<br>• Trees can be either evergreen or deciduous.<br>• Evergreen trees keep their green leaves all year round.<br>• Deciduous trees lose their leaves every autumn.<br><br>Plant Growth<br>• All flowering plants make seeds (reproduction) that can grow (germinate) into new plants<br>• Know that plants produce seeds that grow into new plants that are the same.<br>• Plants need water, light and a suitable temperature to grow and stay healthy<br>• A seed contains a miniature plant that can develop into a fully grown plant.<br>• A bulb has underground vertical shoots which already has leaves<br>• Seeds and bulbs need water to grow but most do not need light (germination)<br>• Know that seeds and bulbs need to be buried underground in soil (to grow at their best) and that they will grow into adult plants under the right conditions (water, warmth)<br>• Seeds and bulbs have food stores inside them to help the plant start to grow. |

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| | | ● Link a property to how suitable materials are for particular uses: (e.g. bricks used for houses cannot be squashable, material used for windows must be transparent) including wood, metal, plastic, glass, brick, rock, paper and cardboard. | ● Structure of plants and trees can include leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem<br>● Some plants die after it has produced its seed and sometimes the plant lives for many years producing seeds each year<br><br>Plant Survival<br>● To survive, plants need to get water, light, and avoid being eaten<br>● Know that plants that are deprived of light, food (water) or the right temperature will not grow well and will die.<br>● A seed produces roots to allow water to get into the plant.<br>● A seed produces shoots to produce leaves to collect the sunlight. |
| **Disciplinary Skills** | ● Children will perform simple test using data loggers to record data on the temperate outside<br>● They will use their observations to suggest answers to questions<br>● They quill record their data in tables | ● Children will compare and group materials based on their properties<br>● They will perform a simple fair test to prove which material is best for a waterproof coat<br>● They will record their answers in a table | ● Children will sort and group plants and trees<br>● They will ask simple questions such as 'will the plant grow in …'<br>● They will observe the changes in their seeds as they germinate<br>● They will use their observations to answer questions about where seeds will grow best<br>● They will record their data in tables |
| **Vocabulary** | summer, autumn, winter, spring, daylight, weather, wind, rain, snow, hail, sleet, fog, sun, hot, warm, cold, temperature | object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy, not-bendy, waterproof, not waterproof, absorbent, not absorbant | wild, garden, flower, deciduous, evergreen, leaf, root, flower, stem, trunk, branches, fair test, variable |
| **Assessment** | Headstart assessment on seasons | Headstart assessment on materials and their properties | Headstart assessment on plants |

| | SPRING 2 | SUMMER 1 | SUMMER 2 |
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| **Description** | Children will understand the key differences between types of animals. They will understand the differences between carnivores, herbivores and omnivores and understand that animals have offspring. They will identify and classify different types of animals based on their characteristics and what they eat. | Children will learn the basic parts of the human body and be able to label them. They will learn which body part is associated with each of the five senses. | Children will learn about the importance of exercise and nutrition for humans as well as dental health and hygiene |
| **NC Objectives** | • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals<br>• Identify and name a variety of common animals that are carnivores, herbivores or omnivores<br>• Describe and compare the structure of a variety of animals<br>• Notice that animals, including humans, have offspring which grow into adults<br>• Find out about the basic needs of animals for survival | • Identify, name and draw and label the basic parts of the human body and say which part is associated with which sense | • Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene |
| **Substantive Knowledge** | ● Animals are groups of living things that need to consume food to survive.<br>● There are many different groups of animals including fish, amphibians, reptiles, birds and mammals. They have different structures (beaks, wings, gills, fins), and they eat different types of foods.<br>● The structure of a variety of common animals varies.<br>Mammals have hair/fur, give birth to live young and feed them<br>fish can breathe underwater using gills, lay eggs (most of them)<br>birds have feathers, beaks and wings, females lay eggs, most birds can fly.<br>Reptiles are air breathing and have scaly skin and lay eggs.<br>Amphibians have smooth slimy skin and live on land and in water.<br>●Know that different animals eat different sorts of food<br>Some animals eat other animals (carnivores)<br>others only eat vegetables (herbivores)<br>some like to eat both plants and meat (omnivores)<br>● Be able to name two examples of carnivores, two examples of herbivores and two examples of omnivores, including:<br>● Common animals that are carnivores include lions, cats, sharks and snakes<br>● Common animals that are herbivores include cows, horses, sheep, rabbits, elephants and deer<br>● Common animals that are omnivores include humans, bears, monkeys and seagulls<br>● Know that animals including humans need food, water and air to survive<br>Know that all things that are living, move, feed, grow, reproduce (have young/babies) and use their senses (MRS GREN)<br>● Animals grow until they reach adulthood (fully grown) | ● Basic parts of the human body (building on FS - new learning in bold) - head, hair, eyes, nose, mouth, ears, tongue, teeth, shoulders, arms, elbows, wrists, hands, fingers, knuckles, chest, hips, legs, knees, ankles, feet, toes<br>● Know that humans have five senses.<br>The five sense organs are the eyes (for seeing), nose (for smelling), ears (for hearing), tongue (for tasting), and skin (for touching or feeling).<br>● Animals have senses to help them survive | ● Animals have senses to help them survive<br>● Exercise, eating the right amounts of different types of food and hygiene are important to maintain good health and wellbeing |

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| | and then don't grow any larger<br>● Know that humans have babies that grow into children, teenagers then adults<br>● Children learn lots of new skills to become independent and these skills progress as they get older. E.g babies cannot feed themselves but toddlers can, babies don't walk, they begin to crawl and then toddlers learn to walk<br>● Know that animals, including humans, have offspring (babies) that grow into adults<br>● All animals (living things) eventually die<br>● Different animals live to different ages<br>● Different animals reproduce at different ages | | |
| **Disciplinary Skills** | • Children will sort and group animals into fish, amphibians, reptiles, birds and mammals and by carnivore, herbivore or omnivore<br>• They will use observation to compare animals based on their structure | • Children will use careful observation to answer questions about the sense<br>• They will perform simple, practical tests to learn about some of the sense | • Children will sort foods into groups<br>• They will perform simple, practical tests to learn about the basic effect of exercise on our bodies<br>• They will observe closely the changes in their body before and after exercise |
| **Vocabulary** | fish, amphibian, reptile, bird, mammal, carnivore, herbivore, omnivore, offspring, young, survival, needs | hands, feet, arm, legs, fingers, toes, knees, elbows, chest, neck, head, nose, mouth, eyes, ears, skin, taste, touch, sight,smell, hear | Hygiene, healthy, lifestyle, needs, nutrition, exercise |
| **Assessment** | Headstart assessment on animals, including humans | Headstart assessment on animals, including humans - body parts | Headstart assessment on animals, including humans - exercise |

# SCIENCE

## KEY STAGE ONE - YEAR B

| | AUTUMN 1 | AUTUMN 2 | SPRING 1 |
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| **Description** | Children will learn that living things live in habitats and describe how habitats provide the basic needs for these living things | Children learn the difference between living, dead and never alive | Children will describe how animals obtain their food from plants and other animals - food chains |
| **NC Objectives** | • Identify that most living things live in habitats to which they are suited and describe how habitats provide for the basic needs of different kinds of animals and plants<br>• Identify and name a variety of plants and animals in their habitats | • Explore and compare the differences between things that are living, dead and never alive | • Describe how animals obtain their food from plants and other animals - food chains |
| **Substantive Knowledge** | • Habitats and microhabitats are places where animals and plants live<br>• Know that a habitat is a place where a living thing can find shelter and food<br>• Know that within a habitat there are different microhabitats (e.g. in a woodland, the leaf litter or on the bark of trees), which has different conditions (e.g. light / dark, damp / dry)<br>• Animals live in habitats in which they are suited. Which means that animals have suitable features that help them move and find food and that plants have suitable features that help them grow well.<br>• Different kinds of animals and plants depend on each other within their habitats. | • Everything can be sorted into living (alive), dead or never alive<br>• Know Living things move, grow, consume nutrients and reproduce (plants incl seeds and animals)<br>• Know that dead things used to do these things, but no longer do; and that things that never lived have never done these things.<br>• All living things die<br>• Dead things include dead animals and plants as well as parts of plants and animals that are no longer attached e.g. leaves and branches, shells, fur, hair and feathers.<br>• Never alive can be natural (rocks) or man made (plastic) | • Animals must move to get their food<br>• They will physically move in different ways to get their food<br>• Animals that eat other animals are called predators<br>• Animals that are eaten by other animals are called prey<br>• Animals get their food from plants and other animals. This can be shown in a food chain.<br>• A food chain begins with a producer. This is often a green plant because plants can make their own food.<br>• A living thing that eats other plants is called a consumer. |
| **Disciplinary Skills** | • Sort animals into habitats<br>• Sort animals into microhabitats<br>• Observe animals in habitats | • Ask and answer questions about living things and their habitats<br>• Classify into living, dead and never alive | • Classify animals into carnivores, herbivores and omnivores<br>• Using simple food chain diagrams |
| **Vocabulary** | Habitat, micro-habitat, suitability, adapted | living, dead, never alive, move, feed (nutrition), reproduce (have young), grow, senses | Carnivore, herbivore, omnivore, food chain, producer, consumer |
| **Assessment** | Headstart assessment on living things | Headstart assessment on living, dead and never alive | Headstart assessment on animals obtaining food |

| | SPRING 2 | SUMMER 1 | SUMMER 2 |
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| **Description** | Children will name and compare different animals, thinking about their offspring | Children will learn about the changes across the seasons, focussing on spring and summer | Children will learn about the weather associated with each of the seasons and how the day length varies across the year |
| **NC Objectives** | Children will name and compare different animals, thinking about their offspring | • Observe changes across the four seasons | • Observe changes across the four seasons<br>• Observe and describe the weather associated with the seasons and how day length varies |
| **Substantive Knowledge** | • Animals are groups of living things that need to consume food to survive.<br>• There are many different groups of animals including fish, amphibians, reptiles, birds and mammals. They have different structures (beaks, wings, gills, fins), and they eat different types of foods.<br>• The structure of a variety of common animals varies.<br>Mammals have hair/fur, give birth to live young and feed them<br>fish can breathe underwater using gills, lay eggs (most of them)<br>birds have feathers, beaks and wings, females lay eggs, most birds can fly.<br>Reptiles are air breathing and have scaly skin and lay eggs.<br>Amphibians have smooth slimy skin and live on land and in water.<br><br>• Animals grow until they reach adulthood (fully grown) and then don't grow any larger<br>• Know that humans have babies that grow into children, teenagers then adults<br>• Children learn lots of new skills to become independent and these skills progress as they get older. E.g babies cannot feed themselves but toddlers can, babies don't walk, they begin to crawl and then toddlers learn to walk<br>• Know that animals, including humans, have offspring (babies) that grow into adults<br>• All animals (living things) eventually die<br>• Different animals live to different ages<br>• Different animals reproduce at different ages | • There are four seasons, spring, summer, autumn and winter<br>• Each season is about three months long<br>• In spring, young animals like lambs and chicks are born, the flowers bloom and the weather starts to become warmer.<br>• In summer the trees are full of green leaves and the weather is at its warmest. | • Daylight hours change throughout the seasons.The hours of daylight are less in winter and more in summer<br>• In spring and summer, the weather is usually sunnier, warmer but we still have cold days and rain<br>• Know which months have the shortest/longest days |
| **Disciplinary Skills** | • Identify common animals and classify them by grouping<br>• Classify into mammals, fish, amphibians, reptiles, birds | • Children will use careful observation to answer questions about the seasons | • Children will perform simple test using data loggers to record data on the temperate outside<br>• They will use their observations to suggest answers to questions<br>• They will record their data in tables |
| **Vocabulary** | fish, amphibian, reptile, bird, mammal, structure, legs, winds, beak, tail, ear, horns, scales, offspring, grow, young, baby, toddler, child, teenager, adult, spawn, tadpole, frog, egg, chick, hen, rooster | spring, summer, autumn, winter, seasons, year, months | summer autumn, winter, spring, day ,daytime, weather, wind, rain, snow, hail, sleet, fog, sun, hot, warm, cold, temperature |
| **Assessment** | Headstart assessment on animals, groups and offspring | Headstart assessment on seasons | Headstart assessment on seasons |

# SCIENCE

## LOWER JUNIORS - YEAR A

| | AUTUMN 1 | AUTUMN 2 | SPRING 1 |
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| **Description** | Children will learn about the different states of matter and how some materials change state when heated or cooled | Children will learn about the different states of matter and how some materials change state when heated or cooled . | Children learn about the importance of light to see and how it is reflected and how shadows are formed. |
| **NC Objectives** | • To compare and group materials together according to whether they are solids, liquids or gases<br>• To 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)<br>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. | • To compare and group materials together according to whether they are solids, liquids or gases<br>• To 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)<br>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. | • Recognise that they need light in order to see things and that dark is the absence of light.<br>• Notice that light is reflected from surfaces.<br>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes<br>• Recognise that shadows are formed when light from a light source is blocked by an opaque object<br>• Find patterns in the way that the size of shadows change. |
| **Substantive Knowledge** | • Know that materials can be divided into solids, liquids and gases.<br>• Know that things are made of particles (tiny building blocks) and that these are organised differently in different states<br>• Know that solids hold their shape unless forced to change.<br>• Know that liquids flow easily and stay in a container.<br>• Know that the more viscous a liquid the less runny it is.<br>• Know that gases move everywhere, will move freely to fill a container and have no fixed shape or volume.<br>• Know that materials can change state when heated or cooled.<br>• Know that heating causes solids to melt into liquids and liquids to evaporate to gases.<br>• Know that cooling causes gases to condense to liquids and liquids to freeze to solids.<br>• Know that different substances change state at different temperatures but the temperatures at which given substances change state is always the same.<br>• Know that water changes state at about 0°C and 100°C<br>• Know that evaporation is different from boiling<br>• Know that liquids evaporate slowly, even below their boiling temperatures<br>• Know that water flows around our world in a continuous process called the water cycle<br>• Know that liquid water evaporates into water vapour, condenses to form clouds, and precipitates back to earth in the form of rain and snow. | | Light and Sight<br>• There must be light for us to see.<br>• Darkness is the absence of light.<br>• Light comes from a source.<br>• Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes<br>• Know that many light sources give off light and heat e.g. filaments in bulbs<br>• Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun<br>• We need light to see things, even shiny things.<br>• Light from the sun can be dangerous and that there are ways to protect their eyes<br><br>What Light Does When it Hits Materials<br>• If an object is transparent (can be seen through), light will go through it and we will be able to see through it.<br>• If an object is opaque (cannot be seen through), it will block the light and no light will get through.<br>• Know we get shadows when light is blocked by an opaque object. We do not get shadows from transparent objects as light passes through them<br>• The closer to the light source an object is, the bigger the shadow will be. This is because the object blocks more of the light.<br>• The further away from the light source an object is, the smaller the shadow will be. This is because the object blocks less of the light.<br>• If an object is perfectly reflective, light will bounce back off it and we will see reflections of objects.<br>• If the material is translucent, it will allow light through, but we won't be able to see through it.<br>• Know that light is reflected when it travels from a light |

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| | | source and then ‘bounces’ off an object |
| **Disciplinary Skills** | ● Know how to raise their own relevant questions about the world around them in response to a range of scientific experiences<br>● Know how to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions;<br>● Know that fair tests are necessary<br>● Know how to set up a fair test, making decisions about what observations to make, how long to make them for and the type of simple equipment that might be used<br>● Know how to make systematic and careful observations and observe changes over time<br>● Know that data loggers can be used to measure a variety of data electronically and how to use them<br>● Know how to ask their own questions about what they observe<br>● Know that thermometers are used to measure temperature and how to read them accurately<br>● Know how to set up and carry out simple comparative and fair tests<br>● Know how to collect data from their own observations and measurements<br>● Know how to present data in a variety of ways to help in answering questions<br>● Know how to record findings using scientific language, drawings, labelled diagrams<br>● Know how to draw simple conclusions from their results<br>● Know how to make predictions<br>● Know that investigations might need improvements and how to suggest them<br>● Know how to raise further questions which could be investigated<br>● Know how to talk about, and then go on to write about, what they have found out<br>● Know how to report and present their results and conclusions to others in written and oral forms with increasing confidence<br>● Know how to make links between their own science results and other scientific evidence<br>● Know how to identify similarities, differences, patterns and changes relating to simple scientific ideas and processes<br>● Draw conclusions based on a relationship (the bigger the….the louder the…) - the er er rule<br>● Use scientific evidence to answer questions<br>● Suggest improvements and raise additional questions | ● Know how to raise their own relevant questions about the world around them in response to a range of scientific experiences<br>● Know how to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions;<br>● Know that fair tests are necessary<br>● Know how to set up a fair test, making decisions about what observations to make, how long to make them for and the type of simple equipment that might be used<br>● Know how to make systematic and careful observations and observe changes over time<br>● Know how to ask their own questions about what they observe<br>● Know that rulers, tape measure, meter rules are used to measure length and how to take accurate measurements using standard units using them<br>● Know how to set up and carry out simple comparative and fair tests<br>● Know how to collect data from their own observations and measurements<br>● Know how to present data in a variety of ways to help in answering questions<br>● Know how to record findings using scientific language, drawings, labelled diagrams<br>● Know how to draw simple conclusions from their results<br>● Know how to make predictions<br>● Know that investigations might need improvements and how to suggest them<br>● Know how to raise further questions which could be investigated<br>● Know how to talk about, and then go on to write about, what they have found out<br>● Know how to report and present their results and conclusions to others in written and oral forms with increasing confidence<br>● Know how to make links between their own science results and other scientific evidence<br>● Know how to identify similarities, differences, patterns and changes relating to simple scientific ideas and processes<br>● Draw conclusions based on a relationship (the bigger the….the louder the…) - the er er rule<br>● Use scientific evidence to answer questions<br>● Suggest improvements and raise additional questions |
| **Vocabulary** | Solid, solidify, ice, melt, freeze, liquid, evaporate, condense, gas, changing state, heated, heat, colled, cool, degrees Celsius (°C), thermometer, water cycle, evaporation, condensation, temperature, melting, melting point, water, water vapour | Light, light source, dark, reflection, reflect, reflective, ray, shadow, prediction, fair test, variable, anomaly |
| **Assessment** | Headstart quiz - States of Matter | Headstart assessment on light |

| | SPRING 2 | SUMMER 1 | SUMMER 2 |
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| **Description** | To group, compare and describe rocks and soils. | Sound: Children learn about how vibrations cause sound and what pitch and volume are. | Sound: Children learn about how vibrations cause sound and what pitch and volume are. |
| **NC Objectives** | • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties<br>• Describe in simple terms how fossils are formed when things that have lived are trapped within rock<br>• Recognise that soils are made from rocks and organic matter. | • To identify how sounds are made, associating some of them with something vibrating<br>• Recognise that vibrations from sounds travel through a medium to the ear<br>• Find patterns between the pitch of a sound and features of the object that produced it<br>• Find patterns between the volume of a sound and the strength of the vibrations that produced it<br>• Recognise that sounds get fainter as the distance from the sound source increases. | • To identify how sounds are made, associating some of them with something vibrating<br>• Recognise that vibrations from sounds travel through a medium to the ear<br>• Find patterns between the pitch of a sound and features of the object that produced it<br>• Find patterns between the volume of a sound and the strength of the vibrations that produced it<br>• Recognise that sounds get fainter as the distance from the sound source increases. |
| **Substantive Knowledge** | • Know that a rock is a solid material made up of minerals forming part of the surface of the Earth.<br>• Know that rocks are exposed on the surface at cliffs, hills and mountains but are also under the surface.<br>• Know that there are three kinds of rocks: igneous, sedimentary and metamorphic.<br>• Know that these three types of rocks all have different properties to each other, including hardiness.<br>• Know that the properties of the rock depend on how the rock was formed<br>• Know that igneous rocks form from molten rock below the Earth's crust (e.g. granite and basalt).<br>• Know that sedimentary rock is formed when small pieces of rock or shell settle and stick together, often in layers (e.g. limestone and sandstone).<br>• Know that metamorphic rocks form when rocks in Earth's crust get squashed and heated (e.g. marble and slate).<br>• Know that some rocks and stone are manmade and others are natural<br>• Know that some rocks are permeable (allow things to pass through them) and others are impermeable (do not allow things to pass through them).<br>• Know that some rocks, called ores, contain metals.<br>• Know that soil is a mixture of crumbled rock and dead plants and animals broken down by the action of weather (weathering).<br>• Soil is made up of small broken-down pieces of rock.<br>• Soil contains a range of different size rock pieces, e.g. sand grains or stones<br>• Soil also contains humus (rotted plant material)<br>• Soil made of very fine rock is called silt or clay.<br>• Know that fossils are formed when something dies and is buried in rock or mud so that it cannot be rotted or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal. | Sound<br>• Sounds can be produced in a variety of ways<br>Sounds have the properties of pitch and volume.<br>• When a sound is produced it spreads out from its source in all directions<br>• Sound is caused by vibration (objects move rapidly back and forth or up and down)<br>• When objects vibrate it makes the objects in contact with it also vibrate. This includes the air.<br>The vibration travels through the air and makes other objects it is in contact with vibrate including your ear drum.<br>• Know the sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear<br><br>Pitch and Volume Changes<br>• Pitch and volume are caused by how the material vibrates<br>• The pitch of a sound is caused by how fast an object vibrates. This is called the frequency of vibration. Higher the frequency, higher the pitch<br>Smaller objects or tighter strings tend to vibrate with a higher frequency<br>• The volume of sound is caused by how big each vibration is. This is called the amplitude of vibration. The bigger the amplitude the higher the volume.<br>• Sounds get fainter as the distance from the sound source increases. | |

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| **Disciplinary Skills** | • To use microscopes to identify and classify rocks according to whether they have grains or crystals.<br>• Group and classify rocks based on their appearance and simple physical properties.<br>• Explore different local soils and identify similarities and differences between them.<br>• Research into how fossils are formed.<br>• Know how to raise their own relevant questions about the world around them in response to a range of scientific experiences<br>• Know how to make systematic and careful observations and observe changes over time<br>• Know how to make links between their own science results and other scientific evidence<br>• Know how to use straightforward scientific evidence to answer questions or support their findings<br>• Know that scientific evidence can be used to answer questions or support their findings<br>• Know that secondary sources might help them to answer questions that cannot be answered through practical investigations. | • Know how to raise their own relevant questions about the world around them in response to a range of scientific experiences<br>• Know how to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions;<br>• Know that fair tests are necessary<br>• Know how to set up a fair test, making decisions about what observations to make, how long to make them for and the type of simple equipment that might be used<br>• Know how to make systematic and careful observations and observe changes over time<br>• Know how to ask their own questions about what they observe<br>• Know that data loggers can be used to measure a variety of data electronically and how to use them • Know how to set up and carry out simple comparative and fair tests<br>• Know how to collect data from their own observations and measurements<br>• Know how to present data in a variety of ways to help in answering questions<br>• Know how to record findings using scientific language, drawings, labelled diagrams<br>• Know how to draw simple conclusions from their results<br>• Know how to make predictions<br>• Know that investigations might need improvements and how to suggest them<br>• Know how to raise further questions which could be investigated<br>• Know how to talk about, and then go on to write about, what they have found out<br>• Know how to report and present their results and conclusions to others in written and oral forms with increasing confidence<br>• Know how to make links between their own science results and other scientific evidence<br>• Know how to identify similarities, differences, patterns and changes relating to simple scientific ideas and processes<br>• Draw conclusions based on a relationship (the bigger the….the louder the…) - the er er rule<br>• Use scientific evidence to answer questions<br>• Suggest improvements and raise additional questions |
| **Vocabulary** | Appearance, physical, properties, hard/soft, shiny/dull, rough/smooth, absorbent/not absorbent, fossils, sedimentary, metamorphic, igneous, organic matter, crystals, grains | Vibration, air, ear, hear, sound, volume, pitch, fainter, loud, louder, percussion, string, woodwind, brass, insulate |
| **Assessment** | Headstart assessment on rocks | Headstart assessment on sound |

# SCIENCE

## LOWER JUNIORS - YEAR B

| | AUTUMN 1 | AUTUMN 2 | SPRING 1 |
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| **Description** | Biology - Animals including humans: children learn about nutrition, skeletons, muscles, the digestive system and teeth | Physics - Electricity: the children learn to create simple series circuits and the difference between conductors and insulators | Biology - Living things in their habitats: the children use classification keys to identify living things and learn about the living things in different environments |
| **NC Objectives** | • To identify that animals, including humans, need the right types and amounts of nutrition and that they cannot make their own food.<br>• Identify that humans and some other animals have skeletons and muscles for support, protection and movement<br>• Describe the simple functions of the basic parts of the digestive system in humans.<br>• Identify the different types of teeth in humans and their simple functions.<br>• Construct and interpret a variety of food chains, identifying producers, predators and prey. | • Identify common appliances that run on electricity<br>• 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<br>• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit<br>• Recognise some common conductors and insulators and associate metals with being good conductors. | • Recognise that living things can be grouped in a variety of ways<br>• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment<br>• Recognise that environments can change and that this can sometimes pose danger to living things. |
| **Substantive Knowledge** | Nutrition<br>• Animals need a variety of foods to help them grow and survive.<br>Know that animals, including humans, cannot make their own food.<br>• Different animals require different foods to survive.<br>Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth)<br>• The main food groups are:<br>• Meat, dairy and pulses provide protein for muscles.<br>• Grains and root vegetables provide carbohydrates for energy.<br>• Fat for insulation and energy.<br>• Fruit and vegetables for minerals, vitamins and fibre. These are essential to keep our bodies working well and protect us from illnesses.<br>• Animals get their food from plants and other animals. This can be shown in a food chain. (From Year 2)<br>• A food chain begins with a producer. This is often a green plant because plants can make their own food. (From Year 2)<br>• A living thing that eats other plants is called a consumer. (From Year 2)<br>• Humans require a balanced diet to remain healthy but healthy diets vary depending upon the type of activity that humans do.<br><br>Know that humans and some animals have a skeleton and that this is for movement, protection and support.<br>Skeletons for Protection | Electricity as a Power Source<br>● Lots of devices are powered by electricity<br>● Electricity comes from a source. There are two main sources- batteries and mains<br>● Identify common appliances that run on electricity<br><br>Circuits<br>Know how to construct a simple circuit using components<br>Identify the following things in a circuit: cell, wire, bulb, switch, buzzer, lamp.<br>● A battery is a source of electricity<br>● A battery pushes electricity to the device. A battery is a device that stores chemical energy and converts it to electrical energy.<br>● To be able to push electricity the battery must be connected to the device using wires<br>● This is called a circuit<br>● If there are more batteries added to a circuit this provides a bigger push on the electricity<br>● This will make the device work harder e.g. brighter bulbs, faster spinning motor, louder buzzer<br>● A switch opens and closes a circuit<br>● Know there must be a complete loop for electricity to flow.<br>● Know a circuit with everything in a single loop is a series circuit.<br><br>Conductors and Insulators<br>● Some materials will allow electricity to flow through them- these are conductors<br>● Metals such as silver, gold and copper are good conductors. Water is also a conductor of electricity. | Classifying Living Things<br>● Living things move, respire, are sensitive, grow, reproduce, excrete, require nutrients (MRS GREN building on KS1)<br>● Living things can be divided into groups based upon their characteristics and that living things divided into groups share similarities<br>● Classification keys help group, identify and name living things based on characteristics<br>● Know that animals can be grouped based on their physical characteristics (vertebrates / invertebrates) or their behaviour (carnivores / herbivores / omnivores) etc.<br>● Animals can be classified as vertebrates (having a spine- fish, amphibians, reptiles, birds, and mammals;) or invertebrates (lacking a spine -snails and slugs, worms, spiders, and insects )<br><br>Environmental change<br>● Environmental change affects different habitats differently<br>● Know that environmental change affects the plants and animals - e.g. making it difficult to survive which can result in extinction (where an entire species dies)<br>● Human activity can significantly affect the environment<br>● Know that human activity – such as climate change caused by pollution - can change the environment for many living things, endangering their existence<br>● Different organisms are affected differently by environmental change |

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| | • All vertebrates have internal skeletons that protect vital organs.<br>• Invertebrates have exoskeletons (a solid covering on the outside of their body) that protect vital organs.<br>Skeletons for Support<br>• Skeletons support the weight of land animals. • Stronger bones can support a greater mass.<br>Skeletons and Muscles for Movement<br>• Bones are connected (but can move relative to each other) at joints.<br>• Muscles connect to bones and move them when they contract.<br>• Stronger bones can anchor stronger muscles.<br><br>Teeth<br>• Humans have 2 sets of teeth in their lifetimes<br>• Humans have three main types of teeth- incisors, canines and molars.<br>• Incisors help to bite off and chew pieces of food.<br>• Canines are used for tearing and ripping food.<br>• Molars help to crush and grind food.<br><br>Digestion<br>• Know that food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion<br>• Know the different parts of the digestive system -mouth, tongue, teeth, oesophagus, stomach, small intestine, large intestine, anus<br>• Be able to label the parts of the digestive system<br>• The nutrients in food have to get to every part of the body. The blood transports them.<br>• The role of digestion is to get the nutrients in food to dissolve in the blood, if it doesn't dissolve it can't enter the blood and be transported.<br>• Know that the process of digestion involves breaking down food that can be absorbed by the body. It begins with food being chewed in the mouth by the teeth and saliva added<br>• Know that food is squeezed down the oesophagus towards the stomach in a wave-like action<br>• Know that the stomach releases acid and enzymes to continue breaking down the food; the stomach is an organ; an organ is a part of living thing that has a specific important job<br>• Know that further enzymes and bile break down the food further as it moves through the duodenum towards the small intestine<br>• Know that the small intestine adds more enzymes and then absorbs the nutrients<br>• Know that the large intestine absorbs water from the undigested food<br>• Know that undigested food is stored in the rectum before being excreted through a muscle called the anus | ● Other materials will not allow electricity to flow through them - these are insulators<br>● Plastic, wood, glass and rubber are good electrical insulators. That is why they are used to cover materials that carry electricity. | |

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| **Disciplinary Skills** | ● Know how to collect data from their own observations and measurements<br>● Know how to present data in a variety of ways to help in answering questions<br>● Know how to record findings using scientific language, bar charts<br>● Know that secondary sources might help them to answer questions that cannot be answered through practical investigations. | ● Know how to ask their own questions about what they observe<br>● Know that fair tests are necessary<br>● Know how to set up a fair test, making decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.<br>● Know how to set up and carry out simple comparative and fair tests<br>● Know how to record findings using scientific language, drawings, labelled diagrams, keys, bar charts and tables.<br>● Know how to draw simple conclusions from their results<br>● Know how to make predictions<br>● Know that investigations might need improvements and how to suggest them<br>● Know how to raise further questions which could be investigated<br>● Know how to talk about, and then go on to write about, what they have found out<br>● Know how to identify similarities, differences, patterns and changes relating to simple scientific ideas and processes<br>● Draw conclusions based on a relationship (the bigger the….the louder the…) - the er er rule<br>● Use scientific evidence to answer questions | ● Know how to use criteria for grouping, sorting and classifying using classification tables and keys<br>● Know how to raise their own relevant questions about the world around them in response to a range of scientific experiences<br>● Know how to make links between their own science results and other scientific evidence<br>● Know how to use straightforward scientific evidence to answer questions or support their findings<br>● Know how to identify similarities, differences, patterns and changes relating to simple scientific ideas and processes<br>● Know that scientific evidence can be used to answer questions or support their findings<br>● Know that secondary sources might help them to answer questions that cannot be answered through practical investigations. |
| **Vocabulary** | Food, nutrition, carbohydrates, protein, fats, fibre, water, vitamins, minerals, skeleton, muscle, ligament, tendon, vertebrate, invertebrate, support, protection, movement, digestive system, oesophagus, stomach, liver, producer, predator, prey, food chain, teeth, incisor. | Electricity, plug, wire, circuit, cells, bulbs, switches, buzzers, conductor, insulator, metal, complete, incomplete, loop, battery, series, parallel, circuit, switch | Life processes, living, movement, respiration, sensitivity, growth, respiration, excretion, nutrition, reptile, mammal, amphibian, bird, fish, insect, arachnid, plant, environment, identify, environment, human, deforestation, urbanisation, climate, adapt, danger |
| **Assessment** | Headstart assessment on Animals including humans | Headstart quiz on electricity | Headstart quiz on living things in their habitats |

| | SPRING 2 | SUMMER 1 | SUMMER 2 |
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| **Description** | Biology - Plants: the children learn about the functions of flowering plants and their requirements for life | Physics - Forces and Magnets: the children explore surfaces and magnetic forces | Physics - Forces and Magnets: the children explore surfaces and magnetic forces |
| **NC Objectives** | • Identify and describe the functions of different flowering plants<br>• Explore the requirements of plants for life and growth and how they vary from plant to plant<br>• Investigate the way in which water is transported within plants<br>• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal | • Compare how things move on different surfaces<br>• Notice that some forces need contact between two objects but magnetic forces can act at a distance<br>• Observe how magnets attract or repel each other and attract some materials and not others<br>• 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<br>• Describe magnets as having two poles<br>• Predict whether two magnets will attract or repel each other, depending on which poles are facing | • Compare how things move on different surfaces<br>• Notice that some forces need contact between two objects but magnetic forces can act at a distance<br>• Observe how magnets attract or repel each other and attract some materials and not others<br>• 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<br>• Describe magnets as having two poles<br>• Predict whether two magnets will attract or repel each other, depending on which poles are facing |
| **Substantive Knowledge** | Plants and their Food<br>● Know what distinguishes plants as a group from animals - make their own food from sunlight, don't move around<br>● Plants do not eat food so have to make their own.<br>● This food provides them with energy and materials to grow<br>● To make the food (sugar) plants need water from the ground (which is absorbed through the roots), carbon dioxide from the air and light from the sun.<br>● The water is taken up through the roots from the soil<br>● The stem transports water and minerals from the roots to the other parts of the plant<br>● The carbon dioxide is taken in through the leaves<br>● As well as food, plants also make oxygen which is given out back into the air through the leaves<br><br>The Reproductive Parts of a Flowering Plant<br>● Know that plants begin as a seed, grow then produce seeds<br>● Flowering plants reproduce by the process of pollination<br>● Pollination is the process where pollen (from the male plant) is transferred to the female plant<br>● Pollination leads to the formation of a seed which can grow into a new plant<br>● Flowering plants have evolved specific parts to carry out pollination and seed growth<br>● Those parts are stamen - where pollen is produced, stigma - where pollen is collected, and the ovaries - which contains the eggs that become a seed when the pollen travels down the stigma and meets the egg<br>● Flowers have petals also are a range of colours, patterns, and smells to attract insects<br><br>Seed Dispersal<br>● Plants have evolved many different ways to disperse their seeds<br>● Seed dispersal is the process by which plants spread their seeds out<br>● Seed dispersal increases the chances of seeds | Pushes and pulls<br>● Know that a force can be thought of as a push or a pull<br>● Objects can move (be in motion) in various ways - roll, slide and bounce<br>● The pushing or pulling of an object can affect its motion.<br>● Pushing or pulling can do three things, slow down, speed up or change the direction of an object.<br>● The larger the push/pull the bigger the effect on motion<br><br>Magnets<br>● Know that some forces need contact between two objects, but magnetic forces can act at a distance<br>● Magnets exert attractive forces on some metals<br>● Magnetic forces work through other materials including air, so magnets don't need to be touching to exert their force. It is called a non-contact force<br>● Know that a magnet has two poles. Each end of a magnet is called a pole, opposite poles are called north and south.<br>● Know that there is a magnetic field around a magnet which is strongest at each pole<br>● Magnets exert attractive (attract) forces on each other when the poles facing each other are north and south (opposites).<br>● Magnets exert repulsive (repel) forces on each other when the poles facing each other are the same.<br>● Know that N and N, and S and S, repel and N and S attract<br>● The strength of magnetic forces is affected by: The strength of the magnet, the distance between the magnet and the object, the material the object is made from.<br>● Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic | |

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| | germinating and growing into a mature plant<br>● Seeds can be dispersed by the wind, animals, water, bursting, humans<br><br>What a Seed Does<br>● A seed contains a miniature, undeveloped version of the plant<br>● They contain a food store for the first stage of growth (until the plant can make its own food)<br>● They are surrounded with a protective coat.<br><br>All Flowers are Similar but Different<br>● Plants and flowers look different because they pollinate in different ways<br>● There are two types of pollination - insect and wind<br>● Insect pollinated flowers are usually bright coloured and strong scents<br>● Wind pollinated flowers have less colourful petals and much less scent | |
| **Disciplinary Skills** | ● Know how to raise their own relevant questions about the world around them in response to a range of scientific experiences<br>● Know how to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions;<br>● Know that fair tests are necessary<br>● Know how to set up a fair test, making decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.<br>● Know how to make systematic and careful observations and observe changes over time<br>● Know how to ask their own questions about what they observe<br>● Know how to set up and carry out simple comparative and fair tests<br>● Know how to record findings using scientific language, drawings, labelled diagrams | ● Know how to raise their own relevant questions about the world around them in response to a range of scientific experiences<br>● Know how to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions;<br>● Know that fair tests are necessary<br>● Know how to set up a fair test, making decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.<br>● Know how to collect data from their own observations and measurements<br>● Know how to present data in a variety of ways to help in answering questions<br>● Know how to record findings using scientific language, drawings, labelled diagrams, keys, bar charts and tables.<br>● Know how to use criteria for grouping, sorting<br>● Know how to draw simple conclusions from their results<br>● Know how to make predictions<br>● Know that investigations might need improvements and how to suggest them<br>● Know how to raise further questions which could be investigated<br>● Know how to talk about, and then go on to write about, what they have found out<br>● Know how to report and present their results and conclusions to others in written and oral forms with increasing confidence<br>● Know how to make links between their own science results and other scientific evidence<br>● Know how to identify similarities, differences, patterns and changes relating to simple scientific ideas and processes<br>● Draw conclusions based on a relationship (the bigger the….the louder the…) - the er er rule<br>● Use scientific evidence to answer questions<br>● Suggest improvements and raise additional questions |
| **Vocabulary** | Roots, stem/trunk, leaves, flowers, deciduous, evergreen, blossom, petals, stigma, style, pollen, anther, air, light, water, nutrients, room, pollination, seed formation, seed dispersal, stem, transportation, absorb | Friction, surface, attract, repel, magnetic, force, contact, magnetic, push, pull, pole, North, South, gravity, water resistance, buoyancy |
| **Assessment** | Headstart quiz on plants | Headstart quiz on Forces and Magnets |

# SCIENCE

## UPPER JUNIORS - YEAR A

| | AUTUMN 1 | AUTUMN 2 | SPRING 1 |
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| **Description** | Children will learn about the properties of light and shadow and conduct their own investigations | Children learn about electricity and explore how circuits work, designing their own lines of investigation | Children learn about different types of forces and use their knowledge to follow their own line of enquiry |
| **NC Objectives** | • Recognise that light appears to travel in straight lines<br>• 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<br>• 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<br>• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them | • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit<br>• Use recognised symbols when representing a simple circuit in a diagram | • Explain that unsupported objects fall towards Earth because of the force of gravity acting between the Earth and falling objects<br>• Identify the effects of air resistance, water resistance and friction that act between moving surfaces<br>• Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller forces to have a greater effect |
| **Substantive Knowledge** | How Light Travels<br>● When light is emitted from a light source, it travels in straight lines until it hits an object. This can be represented by an arrow.<br>● Understand that we see a light because it sends light to our eyes<br>● 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.<br>● Shadows form when light hits an opaque object. The area behind the object is in darkness because light can only travel in straight lines.<br>● Shadows have the same shape as objects because light travels in straight lines.<br>● Shadows have the same shape as the objects that cast them.<br><br>What Light Does When it Hits Objects<br>● When light hits a transparent object, it goes through it in a straight line so we can see a clear image through it.<br>● When light hits a translucent material, it goes through it but is scattered, this means light can pass through, but we can't see an image through it.<br>● When light hits a mirrored surface, it reflects off it in straight lines, so we can see an image in the reflective material.<br>● Sometimes when light hits a material it reflects off it in many different directions (it is scattered). In this case light will be reflected but no image will be seen in the material.<br>● Know that when light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction<br>● Shiny surfaces are better reflectors and rough surfaces scatter light more. Opaque objects don't allow any light to pass through them | Circuits<br>● Know the recognised symbols for bulb, motor, buzzer, wire, switch, cell<br>● Know how to use these symbols in a scientific diagram<br>● Know how to set up a series circuit, adding different components - switches, bulbs, buzzers, motors<br><br>Electrical current<br>● Know that current is the flow of electricity through a conductor around a circuit<br>● The power supply in a circuit pushes the current round the circuit<br>● The voltage of the power supply is a measure of this push<br>● Voltage is measure in volts<br>● Batteries have a limited store of energy and when this is gone, they can no longer push the current<br>● When current passes through a device it makes it work<br>● Increasing the voltage (the number of cells in the battery) increases the current. The larger the flow of current, the harder the device works<br>● Know that in a series circuit more cells make lights brighter or buzzer sound louder.<br><br>Electrical resistance<br>● All parts of a circuit offer resistance to electrical current including the wires.<br>● Resistance is the slowing down of electrical current<br>● The more devices added into a circuit the greater the resistance<br>● This means less current flows around the circuit | Water and Air Resistance<br>● When objects move through air and water, they have to push it out of the way. The water and air push back with forces called water resistance and air resistance. The harder it is to push the material out of the way the greater the resistance.<br>● Gases weigh less than liquids and so water resistance is greater than air resistance.<br>● Know that the shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined<br><br>Friction<br>● Friction is a force against motion caused by two surfaces rubbing against each other. It occurs because no surfaces are perfectly smooth; they have bumps and undulations that can interlock when placed on top of each other.<br>● Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves and that this is called friction<br>● To move one interlocking surface over another, one of three things must happen: The surfaces must rise slightly, the bumps on the surface must bend, the bumps on the surface must break<br>● All of these actions require a force, this is what causes friction<br><br>Managing Forces<br>● Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move. |

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| | How We See<br>● Animals see objects when light is reflected off the object and enters the eye through the pupil.<br>● The pupil changes its size to allow enough, but not too much light into the eye.<br>● Too much light damages the eye and too little results in poor quality images.<br>● Know that white light comprises all the colours of light<br>● Know that white light refracted by two surfaces in a prism will spread out so that all of its colours can be seen; this array of colours is called a spectrum; it happens because the different colours of that constitute white light travel at different speeds. | | ● Know levers, pulleys and gears make allow a smaller force to have a greater effect<br>● The use of levers can reduce the force needed to move things. The object you are lifting is called the load, and the force you apply to the arm to make the object move is called the effort.<br>● The use of pulleys can reduce the force needed to move things<br><br>Gravity (FORCE)<br>● Know unsupported objects fall because of gravity between earth and the object.<br>● Gravity is force of attraction between two objects with mass (a quantity of matter)<br>● Know that the amount of matter (stuff) in an object is its mass<br>● The bigger the mass the bigger force it exerts<br>● Gravity works over distance but gets weaker as distance increases<br>● Stars, planets, moons have a very large amount of mass. They exert a gravitational attraction on each other<br>● Differences in gravity result in smaller mass objects orbiting around lager mass objects, e.g., planets around stars and moons around planets<br>● Know that a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move<br>● Know that pull forces can be measured using a device called a force meter |
| **Disciplinary Skills** | ● Know how to select and plan the most appropriate type of scientific enquiry to use to answer scientific questions<br>● Know how to make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them<br>● Know how to plan, set up and carry out comparative and fair tests to answer questions, including recognising and controlling variables where necessary<br>● Know how to make careful and focused observations<br>● Know how to notice patterns<br>● Know how to draw conclusions based in their data and observations<br>● Know how to use their scientific knowledge and understanding to explain their findings<br>● Know how to identify patterns that might be found in the natural environment<br>● Know how to use test results to make predictions for further tests<br>● Know how to use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time. | ● Know how to raise their own relevant questions about the world around them in response to a range of scientific experiences<br>● Know how to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions;<br>● Know how to explore and talk about their ideas, raising different kinds of scientific question<br>● Know how to ask their own questions about scientific phenomena<br>● Know how to select and plan the most appropriate type of scientific enquiry to use to answer scientific questions<br>● Know how to make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them<br>● Know how to plan, set up and carry out comparative and fair tests to answer questions, including recognising and controlling variables where necessary<br>● Know which is the most appropriate equipment to make measurements and explain how to use it accurately<br>● Know how to make careful and focused observations<br>● Know how to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar graphs and line graphs. | ● Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary by comparing friction, water resistance, leavers and pulleys)<br>● Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate by recording<br>● Use test results to make predictions to set up further comparative and fair tests, for example, how a surface or height of a ramp affects the travel of car<br>● Report and present findings from enquiries, including conclusions, causal relationships and explanations and a degree of trust in results, in oral and written forms such as displays and other presentations |

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| | | ● Choose the best method to present data and finding<br>● Know how to notice patterns<br>● Know how to draw conclusions based in their data and observations<br>● Know how to use their scientific knowledge and understanding to explain their findings<br>● Know how to identify patterns that might be found in the natural environment;<br>● Know how to look for different causal relationships in their data<br>● Know how to discuss the degree of trust they can have in a set of results<br>● Know how to independently report and present their conclusions to others in oral and written forms<br>● Know how to use their test results to identify when further tests and observations may be needed<br>● Know how to use test results to make predictions for further tests<br>● Know how to use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time. | |
| **Vocabulary** | Optics reflection reflective lux luminous reflection refraction angle of incidence | Particles circuit components voltage cell motor | Force motion friction resistance buoyancy newtons streamline |
| **Assessment** | Headstart assessment on light | Headstart assessment on electricity | Headstart assessment on forces |

| | SPRING 2 | SUMMER 1 | SUMMER 2 |
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| **Description** | Children learn about animals and their habitats, and explore the life cycles of different species | Children learn about animals and their habitats, and explore the life cycles of different species | |
| **NC Objectives** | • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird<br>• Describe the life process of reproduction in some animals<br>• Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms and and animals<br>• Give reasons for classifying animals based on specific characteristics | • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird<br>• Describe the life process of reproduction in some animals<br>• Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms and and animals<br>• Give reasons for classifying animals based on specific characteristics | |
| **Substantive Knowledge** | Life cycles<br>● Know that the life cycle of a living thing is a series of stages of development starting with a fertilized egg in animals or a seed in many plants<br>● Mammals, amphibians, insects and birds have different life cycles.<br>Know that in most mammals (e.g. dogs) a<br>fertilized egg develops in the womb into an embryo and is then born and fed on<br>milk before it is weaned onto the food that is adapted to eat; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again<br>-Know that in amphibians (e.g. frogs) a fertilized egg develops into an embryo and then hatches, it then develops adult characteristics, metamorphoses into the adult form after which it can reproduce and the cycle can begin again<br>-Know that in many insects (e.g. butterflies) a<br>fertilized egg develops into wingless feeding form called a larva (caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this<br>cocoon, the pupa metamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again<br>-Know that in birds a fertilized egg hatches in a nest (a hatchling) and is fed<br>by its parents until it is ready to fly (i.e. becomes a fledgling); it then leaves the nest and grows into an<br>adult after which it can reproduce and the cycle can begin again<br>● Life cycles vary in time depending on the species of animal- it can be as short as just a few weeks for insects, to up to 200 years for sea urchins. Larger animals often have longer life cycles but not always.<br>● All animal life cycles begin with growth and development followed by reproduction.<br>● Some animals undergo a complete metamorphosis as they grow. Metamorphosis is a process where animals undergo an abrupt and obvious change in the structure of their body and their behaviour.<br>● Some animals are eusocial. This means they live in colonies (groups) with one animal or group producing young and the others working to care for them.<br>● Plants use either sexual or asexual reproduction<br><br>Classifying Living Things<br>● All living (and extinct) organisms are classified into groups based upon their physical features.<br>● This includes animals, plants, fungi, and microorganisms like bacteria.<br>● Within each of these broad groups, organisms are classified into small subgroups<br>Animals- invertebrates, mammals, birds, amphibians, reptiles and fish<br>Plants- flowering plants, ferns, conifers, moss.<br>● Bacteria are a group of organisms that are not visible to the naked eye but are very abundant and have distinct physical features we can only see under powerful microscopes.<br>● Know that there are three types of micro-organism: viruses, fungi and bacteria<br>● Know that germs are disease-causing bacteria | |
| **Disciplinary** | • Know how to record data from a choice of familiar approaches | | |

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| **Skills** | ● Know how to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar graphs and line graphs.<br>● Choose the best method to present data and finding<br>● Know how to use primary and secondary sources evidence to justify ideas<br>● Know that evidence can refutes or supports their ideas and how to find it<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact;<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact<br>● Know how to use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time. | | |
| **Vocabulary** | species, microorganisms asexual reproduction, sexual reproduction, metamorphosis, life cycle adaptation, vertebrate, life cycle, reproduction, species, process, structures, function, stages, growth, germinate, dissect, classify, species, taxonomy, specific characteristics, observable traits, similarities, differences, circulatory system, atrium, ventricle (means little belly), valves, nutrients, oxygenated blood, arteries, veins, capillary vessels | classify, species, taxonomy, specific characteristics, similarities, differences | |
| **Assessment** | Headstart assessment on living things and their habitats | Headstart assessment on the properties of materials | |

# SCIENCE

## UPPER JUNIORS - YEAR B

| | AUTUMN 1 | AUTUMN 2 | SPRING 1 |
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| **Description** | Children learn about animals including humans | Children learn about the solar system and how celestial bodies relate to each other | Children learn about properties and changes of materials |
| **NC Objectives** | • Describe the changes as humans develop to old age<br>• Identify and name the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood<br>• Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function<br>• Describe the ways in which nutrients and water are transported within animals, including humans | • Describe the movement of the Earth, and other planets, relative to the sun in the solar system<br>• Describe the movement of the moon relative to the Earth<br>• Describe the sun, Earth and moon as approximately spherical bodies<br>• Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky | • Compare and group together everyday materials on the basis of their properties<br>• Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution<br>• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating<br>• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic<br>• Demonstrate that dissolving, mixing and changes of state are reversible changes<br>• Explain that some changes results in the formation of new materials, and that this king of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda |
| **Substantive Knowledge** | Human Life Cycle<br>• All humans go through the stage; foetus, baby, infancy, adolescence, adulthood, late adulthood (old age)<br>• Know that humans go through stages of development;<br>- they begin as fertilized eggs and then develop into embryos before developing into babies;<br>- once they are born, these newborn babies become infants (roughly 2 months to 2 years)<br>- then into young children (roughly 2-12 years old);<br>- children develop into adults during adolescence (roughly 12-16 years old) at which age they become physically capable of reproduction;<br>- as adults develop into old age (roughly 55+ years old) they experience changes in their body which require them to move more carefully and rest more frequently<br>• during puberty, changes happen to our bodies to prepare humans for adulthood<br>• The gestation period for humans is 9 months<br>• The gestation period for other animals can be longer or shorter than 9 months<br><br>Getting Oxygen into the Blood<br>• All animals need oxygen to survive.<br>• Air is breathed into the lungs where the oxygen in the air is passed into the blood.<br>• Every part of animals' bodies need oxygen, especially muscles.<br>• Muscles need a supply of oxygen and sugar (glucose) to | Our Solar system<br>● A Solar system is a collection of planets, which orbit (a curved path) a star.<br>● There are a huge number of stars in space and therefore a huge number of solar systems.<br>● Our solar system consists of 8 planets, many of those planets have moons which orbit around them. Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, (pluto - dwarf planet)<br>● Know planets orbit a star,(exceptionally hot ball of gas) our star is the sun.<br>● We live on a planet<br>● Earth's moon is not a planet but is a satellite which orbits Earth. It is around a quarter of the size of Earth.<br>● As the moon orbits Earth, the sun lights up different parts of it, making it seem as if the moon is changing shape. We call these the phases of the moon.<br>● The moon doesn't emit (give off) light itself, the 'moonlight' we see is actually the sun's light reflected off the lunar surface.<br>● Our solar system can be represented with a model, but it isn't possible to draw it to scale.<br>● The planets and moons are rotating (spinning)<br>The time it takes one planet to rotate is called a day. On Earth this is 24 hours<br>● The time it takes a planet to complete one orbit around its star is called a year. On Earth this is 356.25 days<br>● The solar system is with a massive collection of stars | Mixtures<br>● A substance is an object with the same properties throughout.<br>● A mixture is when more than one substance is present in the same container<br><br>Dissolving<br>● When a substance is added to a liquid the substance can disappear- this is called dissolving<br>● A mixture of a substance that has dissolved in a liquid is called a solution<br>● Not every substance can dissolve in water<br><br>Separating Mixtures<br>● Mixtures can be separated if the substances have different properties<br>● This is because the substances in the mixture are still present and are unchanged<br>● There are different techniques for separating mixtures.<br>-Filtration requires the substances be one that does not dissolve in a liquid to work.<br>- Sieving requires the substances to be of different sizes to work<br>- Magnets require the substances to be some magnetic materials and some non-magnet materials to work.<br>- Evaporation requires a solid substance dissolved in water and the solid has a higher boiling point in water to work. |

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| | make them work, they are supplied by the blood.<br><br>The Blood Circulation Model<br>• The heart is a vital organ that pumps blood through the blood vessels.<br>• Blood vessels are the tubes that blood flows through.<br>• The blood circulates around the body in a way that ensures all muscles in the body get a supply of oxygen and sugar.<br>• The heart pumps blood to every muscle in the body. The circulatory route must allow the blood to collect oxygen from the lungs, sugar from the intestines and visit muscles.<br>• The blood then returns to the heart where it is pumped again.<br>• Blood vessels are channels (tubes) that carry blood throughout your body<br>• Arteries (a type of blood vessel) carry blood away from the heart<br>• Veins (a type of blood vessel) carry blood into the heart<br>• Exercise helps the heart to work more efficiently.<br>• Eating a healthy diet helps to keep the blood vessels from getting blocked.<br>• Avoiding smoking, drugs and alcohol keeps our hearts healthy<br>• Know that alcohol, smoking, and drugs harm the heart by increasing blood pressure, damage blood vessels, and raise the risk of heart disease. | called the galaxy (called the Milky way)<br>● The Milky way is one of billions of galaxies in the Universe.<br>● Know that our solar system makes up a tiny fraction of the universe<br>● Know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit<br>● Know that night and day are the result of the Earth rotating (turning) on its axis<br>● Know the sun does not move – it just seems to because the earth is rotating<br>● Know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area<br>● Know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon<br>● Know the Earth, Moon and Sun are roughly spherical.<br>● Know planets may have moons orbiting them.<br><br>What Else is in the Solar System?<br>● Stars are huge balls of gas that produce vast amounts of light and heat.<br>● Asteroids are lumps of rock that orbit a star (there are millions in between Mars and Jupiter)<br>Comets are objects that are made of ice, which melts when they get closer to the sun leaving a tail.<br>● Know that humans have sent man-made satellites into orbit that assist with telecommunication | -Floating requires some substances to float and some substances to sink to work.<br><br>Reversible and Irreversible Changes<br>● Know that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place<br>● Know that an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas (e.g. burning, boiling an egg, the reaction of bicarbonate of soda and acid)<br>● All matter, including gas, has mass.<br>● Sometimes, mixed substances react to make a new substance. These changes are usually irreversible.<br>● Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible.<br>● Indicators that something new has been made are the properties of the material are different (colour, state, texture, hardness, smell, temperature)<br>● If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)<br>● Understand meaning of solubility; as when a solid dissolves in a liquid it is described as being soluble (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water)<br>● Know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, and the result is a solution;<br>● Know that a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturate<br>● Know that when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals – the slower the solvent evaporates, the larger the crystals that will be formed<br>● Know that some materials are soluble in water and some are not.<br><br>Materials<br>● Know a property and suggest an associated use of metals, wood and plastic. |
| **Disciplinary Skills** | ● Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs<br>● Report and present findings from enquiries, including conclusions, causal relationships and explanations and a degree of trust in results, in oral and written forms such as displays and other presentations<br>● Identify scientific evidence that has been used to support or refute ideas or arguments | ● Know how to use primary and secondary sources evidence to justify ideas<br>● Know that evidence can refutes or supports their ideas and how to find it<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact;<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate | ● Know how to select and plan the most appropriate type of scientific enquiry to use to answer scientific questions<br>● Know how to make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them<br>● Know how to plan, set up and carry out comparative and fair tests to answer questions, including recognising and controlling variables where necessary.<br>● Know how to make careful and focused observations |

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| | ● Know how to use primary and secondary sources evidence to justify ideas<br>● Know that evidence can refutes or supports their ideas and how to find it<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact;<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact<br>● Know how to use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time. | opinion from fact<br>● Know how to use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time. | ● Know the importance of taking repeat readings and take repeat readings where appropriate<br>● Know how to notice patterns<br>● Know how to draw conclusions based in their data and observations<br>● Know how to use their scientific knowledge and understanding to explain their findings<br>● Know how to identify patterns that might be found in the natural environment;<br>● Know how to look for different causal relationships in their data<br>● Know how to discuss the degree of trust they can have in a set of results<br>● Know how to independently report and present their conclusions to others in oral and written forms<br>● Know how to use their test results to identify when further tests and observations may be needed<br>● Know how to use test results to make predictions for further tests<br>● Know how to use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time<br>● Know how to use primary and secondary sources evidence to justify ideas<br>● Know that evidence can refutes or supports their ideas and how to find it<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact;<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact<br>● Know how to use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time. |
| **Vocabulary** | circulatory system vital, BPM (beats per minute), heart rate, arteries, veins, capillaries, oxygenated blood, deoxygenated blood, valve, atrium, components, plasma, platelets, capillaries, bloodstream dehydration, nutrients, lifestyle choice,, stamina | planet, rotate, spherical, axis, orbit, solar system, scaled, sustain, ellipsoid, gnomon, eclipse | Materials, properties, synthetic, conductivity, permeable, flammable, flexible, soluble, thermal, dissolving, filtering, sieving, solute, solvent, solution, soluble, insoluble, decant (gradually pour), evaporation |
| **Assessment** | Headstart assessment on animals including humans | Headstart assessment on Earth and space | Headstart quiz on properties of materials |

| | SPRING 2 | SUMMER 1 | SUMMER 2 |
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| **Description** | Children learn about properties and changes of materials | Children learn about evolution and inheritance | |
| **NC Objectives** | • Compare and group together everyday materials on the basis of their properties<br>• Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance<br>• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating<br>• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic<br>• Demonstrate that dissolving, mixing and changes of state are reversible changes<br>• Explain that some changes results in the formation of new materials, and that this king of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda | • Recognise that living things have changed over time and that fossils provide information<br>• Know about living things that inhabited the Earth millions of years ago<br>• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents<br>• Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution | |
| **Substantive Knowledge** | Mixtures<br>● A substance is an object with the same properties throughout.<br>● A mixture is when more than one substance is present in the same container<br><br>Dissolving<br>● When a substance is added to a liquid the substance can disappear- this is called dissolving<br>● A mixture of a substance that has dissolved in a liquid is called a solution<br>● Not every substance can dissolve in water<br><br>Separating Mixtures<br>● Mixtures can be separated if the substances have different properties<br>● This is because the substances in the mixture are still present and are unchanged<br>● There are different techniques for separating mixtures.<br>-Filtration requires the substances be one that does not dissolve in a liquid to work.<br>- Sieving requires the substances to be of different sizes to work<br>- Magnets require the substances to be some magnetic materials and some non-magnet materials to work.<br>- Evaporation requires a solid substance dissolved in water and the solid has a higher boiling point in water to work.<br>-Floating requires some substances to float and some substances to sink to work.<br><br>Reversible and Irreversible Changes | Natural selection<br>● Know that living things produce offspring of the same kind.<br>● Know offspring are similar to but not identical to parents (variation).<br>● Evolution is the change of physical form in a population over a long-time span.<br>● Natural selection is the process which controls that change.<br>● In any population there is variation and competition for resources (food, water, mates).<br>● Understand that variation has meant living things have changed over time.<br>● Understand that variation means that animals become more or less able to survive where they live.<br>● Within that variation, organisms that have features which make them better adapted at securing food, water, and mates are more likely to survive and produce offspring which have inherited those same successful features. Those that are not well adapted will eventually go extinct.<br>● Know that animals and plants that are able to survive are adapted to suit their environment and that this adaptation may lead to evolution.<br>● Over a long enough timeline all organisms in a population will have those successful features.<br>● Know that living things changes over time and that this gradual change is called evolution<br>● Know that the process of adaptation leads to evolution<br>● This is known as the Theory of Evolution by Natural Selection and was developed by Charles Darwin in 1859 | |

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| | ● Know that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place<br>● Know that an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas (e.g. burning, boiling an egg, the reaction of bicarbonate of soda and acid)<br>● All matter, including gas, has mass.<br>● Sometimes, mixed substances react to make a new substance. These changes are usually irreversible.<br>● Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible.<br>● Indicators that something new has been made are the properties of the material are different (colour, state, texture, hardness, smell, temperature)<br>● If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)<br>● Understand meaning of solubility; as when a solid dissolves in a liquid it is described as being soluble (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water)<br>● Know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, and the result is a solution;<br>● Know that a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturate<br>● Know that when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals – the slower the solvent evaporates, the larger the crystals that will be formed<br>● Know that some materials are soluble in water and some are not.<br><br>Materials<br>● Know a property and suggest an associated use of metals, wood and plastic. | | |
| **Disciplinary Skills** | ● Know how to select and plan the most appropriate type of scientific enquiry to use to answer scientific questions<br>● Know how to make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them<br>● Know how to plan, set up and carry out comparative and fair tests to answer questions, including recognising and controlling variables where necessary.<br>● Know how to make careful and focused observations<br>● Know the importance of taking repeat readings and take repeat readings where appropriate<br>● Know how to notice patterns<br>● Know how to draw conclusions based in their data and observations | ● Know how to raise their own relevant questions about the world around them in response to a range of scientific experiences<br>● Know how to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions;<br>● Know how to explore and talk about their ideas, raising different kinds of scientific question<br>● Know how to ask their own questions about scientific phenomena<br>● Know how to select and plan the most appropriate type of scientific enquiry to use to answer scientific questions<br>● Know how to make their own decisions about what observations to make, what measurements to use and | |

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| | ● Know how to use their scientific knowledge and understanding to explain their findings<br>● Know how to identify patterns that might be found in the natural environment;<br>● Know how to look for different causal relationships in their data<br>● Know how to discuss the degree of trust they can have in a set of results<br>● Know how to independently report and present their conclusions to others in oral and written forms<br>● Know how to use their test results to identify when further tests and observations may be needed<br>● Know how to use test results to make predictions for further tests<br>● Know how to use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time<br>● Know how to use primary and secondary sources evidence to justify ideas<br>● Know that evidence can refutes or supports their ideas and how to find it<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact;<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact<br>● Know how to use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time. | how long to make them for, and whether to repeat them<br>● Know how to plan, set up and carry out comparative and fair tests to answer questions, including recognising and controlling variables where necessary.<br>● Know which is the most appropriate equipment to make measurements and explain how to use it accurately<br>● Know how to take measurements using a range of scientific equipment with increasing accuracy and precision<br>● Know how to make careful and focused observations<br>● Know the importance of taking repeat readings and take repeat readings where appropriate<br>● Know that keys are used and how to use them<br>● Know how to record to identify, classify and describe living things and materials.<br>● Know how to remove outliers from data, justifying the removal as a potential mis-measurement.<br>● Know how to record data from a choice of familiar approaches<br>● Know how to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar graphs and line graphs.<br>● Choose the best method to present data and finding<br>● Know how to notice patterns<br>● Know how to draw conclusions based in their data and observations<br>● Know how to use their scientific knowledge and understanding to explain their findings<br>● Know how to identify patterns that might be found in the natural environment;<br>● Know how to look for different causal relationships in their data<br>● Know how to discuss the degree of trust they can have in a set of results<br>● Know how to independently report and present their conclusions to others in oral and written forms<br>● Know how to use their test results to identify when further tests and observations may be needed<br>● Know how to use test results to make predictions for further tests<br>● Know how to use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time.<br>● Know how to use primary and secondary sources evidence to justify ideas<br>● Know that evidence can refutes or supports their ideas and how to find it<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact;<br>● Know how to recognise where secondary sources will be most useful to research ideas and begin to separate opinion from fact<br>● Know how to use relevant scientific language and | |

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| | | illustrations to discuss, communicate and justify their scientific ideas<br>● Know how to talk about how scientific ideas have developed over time. | |
| **Vocabulary** | Materials, properties, synthetic, conductivity, permeable, flammable, flexible, soluble, thermal, dissolving, filtering, sieving, solute, solvent, solution, soluble, insoluble, decant (gradually pour), evaporation | Fossil species inheritance adaptation environment evolution offspring parent | |
| **Assessment** | Headstart quiz on properties of materials | Headstart quiz on evolution and inheritance | |