



Froxfield Primary School - Science Progression (Substantive Knowledge)

Pre-school	Class 1 Year R and Year 1	Class 2 Year 2	Class 3 Year 3 and Year 4		Class 4 Year 5 and Year 6	
PLANTS Plant seeds and care for growing plants.	PLANTS Cycle A- Summer 1 Cycle B- Summer 1	NEW PLANTS Cycle A- Spring 2/Summer 1 Cycle B- Spring 2/Summer 1	PLANTS AND THEIR FOOD PRODUCTION Cycle A- Spring 2		PLANT REPRODUCTION Cycle A- Summer 1	
	seed bulb leaves germination roots shoots	flowering reproduction germinate	Carbon dioxide Oxygen Roots Soil Leaves		Pollination Seed Stamen Stigma Ovaries Petals Dispersal Germination	
	<p>Begin to recognise common, local plants and name them.</p> <p>Notice changes in these plants and their link to the seasons.</p> <p>Explore the natural world around them, making observations and drawing pictures of animals and plants.</p> <p>Understand the key features of the life cycle of a plant</p> <p>A seed contains a miniature plant that can develop into a fully grown plant.</p>	<p>All flowering plants make seeds (reproduction) that can grow (germinate) into new plants</p> <p>Plants need water, light and a suitable temperature to grow and stay healthy</p> <p>Some plants die after it has produced its seed and sometimes the plant lives for many generations producing seeds each year</p>	<p>Plants do not eat food so have to make their own.</p> <p>This food provides them with energy, and materials to grow</p> <p>To make the food (sugar) plants need water from the ground, carbon dioxide from the air and light from the sun.</p> <p>The water is taken up through the roots from the soil.</p> <p>The carbon dioxide is taken in through the leaves</p>		<p>Flowering plants reproduce by the process of pollination</p> <p>Pollination leads to the formation of a seed which can grow into a new plant</p> <p>Flowering plants have evolved specific parts to carry out pollination and seed growth</p> <p>Those parts are stamen where pollen is produced, stigma where pollen is collected, and the ovaries which contain the eggs that become a seed when the</p>	

	<p>A bulb has underground vertical shoots which already has modified leaves</p> <p>Seeds and bulbs need water to grow but most do not need light (germination)</p> <p>Seeds and bulbs have food stores inside them to help the plant start to grow.</p> <p>To survive plants, need to get water, light, and avoid being eaten.</p> <p>A seed produces roots to allow water to get into the plant.</p> <p>A seed produces shoots to produce leaves to collect the sunlight.</p> <p>A basic plant structure can include leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem</p>		<p>As well as food, plants also make oxygen which is given out back into the air through the leaves</p>		<p>pollen travels down the stigma and meets the egg</p> <p>Flowers have petals also are a range of colours, patterns, and smells to attract insects</p> <p>Plants and flowers look different because they pollinate in different ways.</p> <p>There are two types of pollination Insect and wind</p> <p>Insect pollinated flowers are usually bright coloured and strong scented</p> <p>Wind pollinated flowers have less colourful petals and much less scent</p> <p>Plants have evolved many different ways to disperse their seeds</p> <p>Seed dispersal increases the chances of seeds germinating and growing into a mature plant</p> <p>A seed contains a miniature, undeveloped version of the plant</p> <p>They contain a food store for the first stage of growth (until the plant can make its own food)</p> <p>They are surrounded with a protective coat.</p>	
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<p>ANIMALS (INCLUDING HUMANS)</p> <p>Observe the lifecycle of a tadpole.</p>	<p>ANIMAL SURVIVAL Cycle A- Spring 1 & 2 Cycle B- Autumn 2 & Spring 2</p>	<p>ANIMAL LIFE CYCLES Cycle A/B- Autumn 1 HEALTH & EXERCISE Cycle A/B – Summer 1</p>	<p>ANIMALS, SKELETONS AND MOVEMENT Cycle A- Autumn 2</p>	<p>DIGESTION Cycle B- Summer 1</p>	<p>CIRCULATION Cycle A- Spring 1</p>	
<p>organisms growth energy fish amphibians mammals birds reptiles herbivore omnivore carnivore predator prey food chain senses</p>	<p>maturity reproduce die offspring life cycle food chain producer consumer</p>	<p>vertebrates invertebrates skeleton exoskeleton vital organs support mass muscles connect contract</p>	<p>Meat Dairy Protein Grains Root vegetable Carbohydrates Fat Insulation Fruits Minerals Vitamins Fibre Healthy Digestion</p>	<p>Oxygen Sugar (Glucose) Lungs Muscles Circulation heart</p>		
<p>Explore the natural world around them, making observations and drawing pictures of animals and plants.</p> <p>Animals are groups of organisms that need to consume food to survive.</p> <p>Food provides energy and the building blocks of growth.</p> <p>There are many different groups of animals including fish, amphibians, reptiles, birds and mammals.</p> <p>They have different structures, and they eat different types of foods.</p> <p>The structure of a variety of common animals varies: Mammals</p>	<p>Things that are living, move, feed, grow, reproduce and use their senses</p> <p>Explore and compare the differences between things that are living, dead and things that have never been alive</p> <p>Animals grow until they reach maturity and then don't grow any larger</p> <p>Animals reproduce when they reach maturity (adulthood)</p> <p>All animals eventually, die</p> <p>Different animals live to different ages</p>	<p>All vertebrates have internal skeletons that protect vital organs.</p> <p>Invertebrates have exoskeletons that protect vital organs.</p> <p>Skeletons support the weight of land animals.</p> <p>Stronger bones can support a greater mass.</p> <p>Bones are connected (but can move relative to each other) at joints.</p> <p>Muscles connect to bones and move them when they contract.</p> <p>Stronger bones can anchor stronger muscles.</p>	<p>Animals need a variety of foods to help them grow and survive. The main food groups are: Meat, dairy and pulses provide protein for muscles. Grains and root vegetables provide carbohydrates for energy. Fat for insulation and energy. Fruit and vegetables for minerals, vitamins and fibre. These are essential to keep our bodies working well and protect us from illnesses.</p> <p>Different animals require different foods to survive.</p> <p>Animals get their food from plants and other animals. This can be shown in a food chain. (From Year 2)</p>	<p>All animals need oxygen to survive.</p> <p>Air is breathed into the lungs where the oxygen in the air is passed into the blood.</p> <p>Every part of animals' bodies need oxygen, especially muscles.</p> <p>Muscles need a supply of oxygen and sugar (glucose) to make them work, they are supplied by the blood.</p> <p>The heart is a vital organ pumps blood through the blood vessels.</p>		

	<p>have hair/fur and give birth to live young, fish can breathe underwater using gills, birds have feathers, beaks and wings. Females lay eggs. Most birds can fly, reptiles are air breathing and have scaly skin and lays eggs, and amphibians have smooth slimy skin and live on land and in water.</p> <p>Some eat other animals (carnivores), and others only eat vegetables (herbivores), and some like to eat both plants and meat (omnivores)</p> <p>Common animals that are carnivores include lions, cats, sharks and snakes</p> <p>Common animals that are herbivores include cows, horses, sheep, elephants and deer</p> <p>Common animals that are omnivores include humans, bears, monkeys and seagulls</p> <p>Animals must move to get their food</p> <p>They will move in different ways to get their food</p> <p>Animals that eat other animals are called predators</p> <p>Animals that are eaten by other animals are called prey</p> <p>Animals feeding relationships can be illustrated in a food chain</p> <p>Identify, name, draw and label the basic parts of the human body and</p>	<p>Different animals reach different sizes before they are able to reproduce</p> <p>Different animals reproduce at different ages</p> <p>Animals, including humans, have offspring which grow into adults</p> <p>Exercise, eating the right amounts of different types of food and hygiene are important to maintain good health and wellbeing</p> <p>Habitats are places where animals and plants live (from Year 1)</p> <p>Animals live in habitats in which they are suited.</p> <p>Identify and name a variety of animals in their habitats.</p> <p>Different kinds of animals and plants depend on each other within habitats.</p> <p>Animals get their food from plants and other animals. This can be shown in a food chain.</p> <p>A food chain begins with a producer. This is often a green plant because plants can make their own food.</p> <p>A living thing that eats other plants is called a consumer.</p> <p>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</p> <p>Describe the importance for humans of exercise, eating the right amounts</p>		<p>A food chain begins with a producer. This is often a green plant because plants can make their own food. (From Year 2)</p> <p>A living thing that eats other plants is called a consumer. (From Year 2)</p> <p>Humans require a balanced diet to remain healthy but healthy diets vary depending upon the type of activity that humans do.</p> <p>Humans have 2 sets of teeth in their lifetimes</p> <p>Humans have three main types of teeth- incisors, canines and molars.</p> <p>Incisors help to bite off and chew pieces of food.</p> <p>Canines are used for tearing and ripping food.</p> <p>Molars help to crush and grind food.</p> <p>The nutrients in food have to get to every part of the body. The blood transports them.</p> <p>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.</p>	<p>Blood Vessels are the tubes that blood flows through.</p> <p>The blood circulates around the body in a way that ensures all muscles in the body get a supply of oxygen and sugar.</p> <p>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.</p> <p>The blood then returns to the heart where it is pumped again.</p> <p>Exercise helps the heart to work more efficiently.</p> <p>Eating a healthy diet helps to keep the blood vessels from getting blocked.</p> <p>Avoiding smoking and alcohol puts less stress on the whole system and keeps it healthier.</p> <p>Describe the changes as humans develop to old age. (Teach in RHE)</p>	
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	<p>say which part of the body is associated with each sense.</p> <p>The five sense organs are the eyes (for seeing), nose (for smelling), ears (for hearing), tongue (for tasting), and skin (for touching or feeling).</p> <p>Animals have senses to help them survive</p> <p>Animals have developed a range of ways to find prey or avoid being eaten</p> <p>Animals have developed a range of ways to find prey or avoid being eaten</p>	of different types of food, and hygiene				
<p>VARIATION AND EVOLUTION</p> <p>Begin to notice and talk about changes to materials within the environment.</p>	<p>HABITATS</p> <p>Cycle A- Summer 2</p> <p>Cycle B- Summer 2</p>			<p>LIVING THINGS</p> <p>Cycle B- Autumn 2</p>	<p>FOSSILS, GEOLOGICAL TIME AND CLASSIFICATION</p> <p>Cycle A- Spring 2</p>	<p>CLASSIFICATION AND EVOLUTION</p> <p>Cycle B Summer 1/Summer 2</p>
	<p>variation</p> <p>habitat</p> <p>adapted</p> <p>survive</p> <p>avoid</p> <p>wild plant</p> <p>garden plant</p>			<p>Classification</p> <p>Classification key</p> <p>Vertebrates (from yr 3 'Animal skeletons and movement')</p> <p>Invertebrates (from yr 3 'Animals, skeletons and movement')</p> <p>Food chain (from yr 1 'Animal Survival')</p> <p>Nutrients (from yr 3 'Plant food production')</p> <p>Organism (from yr 1 'Animal Survival')</p>	<p>Million</p> <p>Billion</p> <p>Evolution</p> <p>Extinct</p> <p>Fossil</p> <p>Palaeontologist</p> <p>Organism (from yr 1 'Animal Survival')</p> <p>Microorganism</p> <p>Bacteria</p> <p>Microscope</p>	<p>Evolution</p> <p>Natural selection</p> <p>Population</p> <p>Variation</p> <p>Competition</p> <p>Adapted</p> <p>Offspring</p> <p>Inheritance</p> <p>Charles Darwin</p> <p>Lamarck</p> <p>HMS Beagle</p>

				<p>Mammal (from yr 1 'Animal Survival')</p> <p>Amphibian (from yr 1 'Animal Survival')</p> <p>Insect</p> <p>Bird (from yr 1 'Animal Survival')</p> <p>Environmental change</p>		
	<p>Take care of the school environment by not wasting and litter-picking.</p> <p>Explore the natural world around them, making observations and drawing pictures of animals and plants.</p> <p>There is variation in all living things</p> <p>Animals and plants live in a variety of different places called habitats</p> <p>Animals and plants have adapted to survive in different habitats</p> <p>Identify and name a variety of animals in their habitats, including microhabitats.</p> <p>Wild plants such as ferns, daisies, nettles and dandelions grow randomly.</p> <p>Garden plants such as roses, tulips, poppies, daffodils are planted intentionally.</p> <p>Plants have specific adaptations for survival To survive they need to get water, light, and avoid being eaten</p>			<p>Living things can be divided into groups based upon their characteristics</p> <p>Classification keys help group, identify and name living things</p> <p>Animals can be classified as vertebrates (having a spine) or invertebrates (lacking a spine) In any habitat there are food chains and webs where nutrients are passed from one organism to another when it is eaten</p> <p>If the population of one organism in the chain or web is affected, it has a knock-on effect to all the others</p> <p>Mammals, amphibians, insects and birds have different life cycles.</p> <p>Lifecycles 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.</p> <p>Larger animals often have longer life cycles but not always.</p> <p>All animal life cycles begin with growth and development followed by reproduction.</p>	<p>The Earth is very old. Around 4.2 billion years. We know this from dating rocks</p> <p>Life first appeared on Earth around 3.8 billion years ago.</p> <p>Life was, at first, very simple but over millions and millions of years, life became more complex through the process of evolution</p> <p>There are many sources of evidence for evolution</p> <p>Fossils are one of the main sources of evidence for evolution.</p> <p>They show when new organisms appear and when they go extinct.</p> <p>Due to the nature of fossil formation and discovery, fossils only provide an incomplete record of evolution.</p> <p>Scientists use fossils along with other pieces of evidence (DNA, Embryology, comparative anatomy, artificial selection) to work</p>	<p>Evolution is the change of physical form in a population over a long-time span</p> <p>Natural selection is the process which controls that change. In any population there is variation and competition for resources (food, water, mates).</p> <p>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.</p> <p>Over a long enough timeline all organisms in a population will have those successful features.</p> <p>This is known as the Theory of Evolution by Natural Selection and was</p>

	<p style="text-align: center;">SEASONS Cycle A- Autumn 1 Cycle B- Autumn 1</p> <p style="text-align: center;">spring summer autumn winter hibernating migration evergreen deciduous</p>			<p>Some animals undergo a complete metamorphosis as they grow.</p> <p>Metamorphosis is a process where animals undergo an abrupt and obvious change in the structure of their body and their behaviour.</p> <p>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.</p> <p>Environmental change affects different habitats differently</p> <p>Human activity significantly affects the environment</p> <p>Different organisms are affected differently by environmental change</p>	<p>out how organisms have evolved</p> <p>Fossils form when dead organisms are rapidly buried or leave an imprint and are turned to stone over a long period of time. If they survive in the Earth, they then have to be found by a palaeontologist who will study them.</p> <p>All living (and extinct) organisms are classified into groups based upon their physical features.</p> <p>This includes animals, plants, fungi, and microorganisms like bacteria.</p> <p>Within each of these broad groups, organisms are classified into small subgroups. Animals- invertebrates, mammals, birds, amphibians, reptiles and fish, Plants- flowering plants, ferns, conifers, moss.</p> <p>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.</p>	<p>developed by Charles Darwin in 1859</p> <p>Before Darwin, Lamarck's Idea of acquired characteristics was proposed. (Giraffes stretch their necks in life, which made their children have longer necks).</p> <p>Darwin as a young man travelled around the world on the HMS Beagle. On this 5-year voyage he saw lots of things and recorded down lots of evidence which allowed him to work out how organisms change over time by a different mechanism of Natural selection</p>
	<p>Notice changes in these plants and their link to the seasons.</p> <p>Notice changing states of matter and their link with weather and seasons</p> <p>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter</p> <p>There are four seasons, Spring, summer, autumn and winter</p> <p>Each season is about three months long</p> <p>In Spring, young animals like lambs and chicks are born, the flowers bloom and the weather starts to become warmer.</p> <p>In Autumn, the leaves fall off the trees and the amount of time we have in the day becomes less.</p>					

	<p>Winter has the shortest amount of time during the day and the weather is at its coldest.</p> <p>In Summer the trees are full of green leaves and the weather is at its warmest.</p> <p>(THIS SUBSTANTIVE KNOWLEDGE ALSO APPEARS IN THE PROGRESSION WITHIN THE PHYSICS- EARTH AND SPACE)</p> <p>Animals and plants have adapted ways of surviving the changing seasons</p> <p>These include hibernating, storing food, fattening up, migration, loss of leaves</p> <p>Trees can be either evergreen or deciduous.</p> <p>Evergreen trees keep their green leaves all year round.</p> <p>Deciduous trees lose their leaves every autumn.</p>					
<p>MATERIALS</p> <p>Recycle paper and compost as part of the daily routines.</p> <p>Begin to notice and talk about changes to materials within the environment.</p>	<p>DESCRIBING MATERIALS</p> <p>Cycle A- Autumn 2 Cycle B- Spring 1</p>	<p>CHANGING MATERIALS</p> <p>Cycle A- Autumn 2 & Spring 1 Cycle B- Autumn 2 & Spring 1</p>	<p>SOLIDS, LIQUIDS AND GASES</p> <p>Cycle A- Summer 1/2</p>	<p>MIXTURES AND SEPARATING THEM</p> <p>Cycle B- Spring 1/Spring 2</p>	<p>MAKING NEW SUBSTANCES</p> <p>Cycle B- Spring 2/Summer 1</p>	
	<p>Properties Metal Rock</p>	<p>changed physical force absorb</p>	<p>State Solid Liquid</p>	<p>Substance Mixture Dissolving</p>	<p>Matter Mass React</p>	

	<p>Fabric Wood Plastic Ceramic Suitable Purpose</p>	<p>crumbly property drag suitable strongest flexible</p>	<p>Gas Gravity Viscous Heating Cooling Melting Boiling Evaporate Freeze Condense</p>	<p>Solution</p>	<p>Irreversible</p>	
	<p>Notice changing states of matter and their link with weather and seasons</p> <p>There are many different materials that have different observable properties</p> <p>Materials that have similar properties are grouped into metals, rocks, fabrics, wood, plastic and ceramics (including glass).</p>	<p>Materials can be changed by physical force (twisting, bending, squashing and stretching).</p> <p>The properties of a material determine whether they are suitable for a purpose.</p>	<p>Materials can be divided into solids, liquids and gases.</p> <p>Solids hold their shape unless forced to change.</p> <p>Liquids flow easily but stay in their container because of gravity. The more viscous a liquid the less runny it is.</p> <p>Gases move everywhere and are not held in containers by gravity.</p> <p>Heating causes solids to melt into liquids and liquids to evaporate to gases.</p> <p>Cooling causes gases to condense to liquids and liquids to freeze to solids.</p> <p>Different substances change state at different temperatures but the temperatures at which given substances changes state is always the same.</p> <p>The temperature at which a substance melts from a solid to a liquid is the same at which it freezes from a liquid to a solid.</p> <p>The temperature at which a substance boils from a liquid to a</p>	<p>A substance is an object with the same properties throughout.</p> <p>A mixture is when more than one substance is present in the same container</p> <p>When a substance is added to a liquid the substance can disappear- this is called dissolving</p> <p>A mixture of a substance that has dissolved in a liquid is called a solution</p> <p>Not every substance can dissolve in water</p> <p>Mixtures can be separated if the substances have different properties This is because the substances in the mixture are still present and are unchanged</p> <p>There are different techniques for separating mixtures</p> <ul style="list-style-type: none"> - Filtration requires the substances be one that does not dissolve in a liquid to work. - Sieving requires the substances to be of different sizes to work 	<p>Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets.</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials including metals, wood and plastic.</p> <p>All matter, including gas, has mass.</p> <p>Sometimes, mixed substances react to make a new substance.</p> <p>These changes are usually irreversible.</p> <p>Heating can sometimes cause materials to change permanently.</p> <p>When this happens, a new substance is made. These changes are not reversible.</p>	

			<p>gas is the same at which it condenses from a gas to a liquid.</p> <p>Liquids evaporate slowly, even below their boiling temperatures.</p> <p>The water cycle is the process by which water is continuously transferred between the surface of the earth and the atmosphere.</p> <p>Liquid water evaporates into water vapor, condenses to form clouds, and precipitates back to earth in the form of rain and snow.</p>	<ul style="list-style-type: none"> - Magnets requires the substances to be some magnetic materials and some non-magnetic materials to work. - Evaporation requires a solid substance dissolved in water and the solid has a higher boiling point in water to work. - Floating requires some substances to float and some substances to sink to work. 	<p>Indicators that something new has been made are the properties of the material are different (colour, state, texture, hardness, smell, temperature)</p> <p>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)</p>	
			<p>ROCKS AND SOILS Cycle A- Autumn 1</p> <p>Rock (from 'Describing Materials' yr 1)</p> <p>Crystal Mineral Ore Grains Fossil Sedimentary Igneous Metamorphic Porosity Hardness Soil Humus Silt</p>			
			<p>A rock is a solid material made up of minerals forming part of the surface of the Earth</p>			

			<p>Rocks are exposed on the surface at cliffs, hills and mountains but are also under the surface.</p> <p>Some rocks, called ores contain metals</p> <p>Some rocks are made of grains squashed together and can contain the remains of long-dead organisms, called fossils. This type of rock is called sedimentary rock, an example would be limestone, sandstone or mudstone</p> <p>Some rocks are made of crystals that are locked tightly together. These are called igneous and metamorphic rocks; an example of igneous rock is granite, and an example of metamorphic rock is slate</p> <p>These three types of rocks all have different properties to each other, including porosity, hardness, reaction to chemicals</p> <p>The properties of the rock depend on how the rock was formed, e.g. Some igneous rocks form from lava from volcanoes and cool very quickly leading to very small crystals</p> <p>Soil is made up of small broken-down pieces of rock. Soil contains a range of different size rock pieces, e.g., sand grains or stones.</p> <p>Soil also contains humus (rotted plant material) Soil made of very fine rock is called silt or clay.</p>			
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EARTH AND SPACE	SEASONS Cycle A- Autumn 1 Cycle B- Autumn 1				SPACE AND GRAVITY Cycle A- Autumn 2	
	spring summer autumn winter hibernating migration evergreen deciduous				Solar System Planets Orbit Star Moon Rotating Day Year Galaxy Universe Asteroid Comet Gravity Mass	
	<p>Notice changes in these plants and their link to the seasons.</p> <p>There are four seasons, Spring, summer, autumn and winter</p> <p>Each season is about three months long</p> <p>In Spring, young animals like lambs and chicks are born, the flowers bloom and the weather starts to become warmer.</p> <p>In autumn, the leaves fall off the trees and the amount of time we have in the day becomes less.</p> <p>Winter has the shortest amount of time during the day and the weather is at its coldest.</p>				<p>A Solar system is a collection of planets, which orbit (a curved path) a star.</p> <p>There are huge number of stars in space and therefore a huge number of solar systems</p> <p>Our solar system consists of 8 planets, many of those planets have moons which orbit around them.</p> <p>Earth's moon is not a planet but is a satellite which orbits Earth. It is around a quarter of the size of Earth.</p> <p>As the Moon orbits the Earth, the Sun lights up different parts of it, making it seem as if the Moon is changing</p>	

	<p>In summer the trees are full of green leaves and the weather is at its warmest.</p> <p>Animals and plants have adapted ways of surviving the changing seasons</p> <p>These include hibernating, storing food, fattening up, migration, loss of leaves</p> <p>Trees can be either evergreen or deciduous. Evergreen trees keep their green leaves all year round.</p> <p>Deciduous trees lose their leaves every autumn.</p> <p>(THIS SUBSTANTIVE KNOWLEDGE ALSO APPEARS IN THE PROGRESSION WITHIN THE BIOLOGY- VARIATION AND EVOLUTION)</p>				<p>shape. We call these the phases of the moon.</p> <p>The Moon doesn't emit (give off) light itself, the 'moonlight' we see is actually the Sun's light reflected off the lunar surface.</p> <p>Our solar system can be represented with a model but it isn't possible to draw it to scale.</p> <p>The planets and moons are rotating (spinning)</p> <p>The time it takes one planet to rotate is called a day. On Earth this is 24 hours</p> <p>The time it takes a planet to complete one orbit around its star is called a year. On Earth this is 356.25 days</p> <p>The solar system is with a massive collection of stars called the galaxy (called the Milky way)</p> <p>The Milky way is one of billions of galaxies in the Universe.</p> <p>Stars are huge balls of gas that produce vast amounts of light and heat.</p> <p>Asteroids are lumps of rock that orbit a star (there are millions in between Mars and Jupiter)</p> <p>Comets are objects that are made of Ice, which melts</p>	
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					<p>when they get closer to the sun leaving a tail.</p> <p>Gravity is force of attraction between two objects with mass (a quantity of matter)</p> <p>The bigger the mass the bigger force it exerts</p> <p>Gravity works over distance but gets weaker as distance increases</p> <p>Stars, planets, moons have a very large amount of mass. They exert a gravitational attraction on each other</p> <p>Differences in gravity result in smaller mass objects orbiting around larger mass objects, e.g., planets around stars and moons around planets</p>	
ELECTRICITY				<p>ELECTRICITY Cycle B- Spring 1 (short)</p>		<p>CONTROLLING ELECTRICAL CIRCUITS Cycle A- Autumn 1</p>
				<p>Electricity Batteries Mains electricity Device Wires Circuit Conductor Insulator</p>		<p>Current Voltage Volts Conductor Resistance Resistor</p>
					<p>Lots of devices are powered by electricity</p>	<p>Use recognised symbols when representing a simple circuit in a diagram.</p>

				<p>Electricity comes from a source There are two main sources- batteries and mains</p> <p>A battery pushes electricity to the device.</p> <p>To be able to push electricity the battery must be connected to the device using wires</p> <p>This is called a circuit</p> <p>If there are more batteries added to a circuit this provides a bigger push on the electricity</p> <p>This will make the device work harder e.g., brighter bulbs, faster spinning motor, louder buzzer</p> <p>Some materials will allow electricity to flow through them- Conductors Metals such as silver, gold and copper are good conductors. Water is also a conductor of electricity.</p> <p>Other materials will not allow electricity to flow through them- Insulators Plastic, wood, glass and rubber are good electrical insulators. That is why they are used to cover materials that carry electricity.</p> <p>A switch opens and closes a circuit</p>		<p>Current is the flow of electricity around a circuit.</p> <p>The power supply in a circuit pushes the current round the circuit</p> <p>The voltage of the power supply is a measure of this push</p> <p>Voltage is measured in volts</p> <p>Batteries have a limited store of energy and when this is gone, they can no longer push the current</p> <p>Current is the flow of electricity through a conductor</p> <p>When current passes through a device it makes it work</p> <p>Increasing the voltage (the number of cells in the battery) increases the current. The larger the flow of current, the harder the device works</p> <p>All parts of a circuit offer resistance to electrical current including the wires.</p> <p>Resistance is the slowing down of electrical current</p> <p>The more devices added into a circuit the greater the resistance</p> <p>This means less current flows around the circuit</p>
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ENERGY PATHWAYS			LIGHT Cycle A- Spring 1	SOUND Cycle B – Summer 2		HOW LIGHT BEHAVES Cycle B- Autumn 2/Spring 1
			Light Source Shiny Transparent Opaque Reflective Translucent	Sound Volume Vibration Wave Particles		Shadow Opaque Transparent Translucent Reflection Pupil
			<p>There must be light for us to see.</p> <p>Light comes from a source.</p> <p>We need light to see things, even shiny things.</p> <p>Light from the sun can be dangerous and that there are ways to protect our eyes</p> <p>If an object is transparent light will go through it and we will be able to see through it.</p> <p>If an object is opaque, it will block the light and no light will get through. This is what forms shadows.</p> <p>The closer to the light source an object is, the bigger the shadow will be.</p> <p>This is because the object blocks more of the light.</p> <p>The further away from the light source an object is, the smaller the shadow will be.</p> <p>This is because the object blocks less of the light.</p>	<p>Sounds can be produced in a variety of ways.</p> <p>Sounds have the property of volume.</p> <p>When a sound is produced it spreads out from its source in all directions</p> <p>Sound is caused by vibration (objects move rapidly back and forth or up and down)</p> <p>When objects vibrate it makes the objects in contact with it also vibrate.</p> <p>This includes the air. The vibration travels through the air and makes other objects it is in contact with vibrate including your ear drum.</p> <p>Volume is caused by how the material vibrates</p> <p>Sounds get fainter as the distance from the sound source increases.</p>		<p>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.</p> <p>Shadows form when light hits an opaque object. The area behind the object is in darkness because light can only travel in straight lines.</p> <p>Shadows have the same shape as the objects that cast them.</p> <p>When light hits a transparent object, it goes through it in a straight line so we can see a clear image through it.</p> <p>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.</p> <p>When light hits a mirrored surface, it reflects off it in straight lines, so we can see</p>

			<p>If an object is perfectly reflective, light will bounce back off it and we will see reflections of objects.</p> <p>If the material is translucent, it will allow light through, but we won't be able to see through it.</p>			<p>an image in the reflective material.</p> <p>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.</p> <p>Shiny surfaces are better reflectors and rough surfaces scatter light more.</p> <p>Opaque objects don't allow any light to pass through them</p> <p>Animals see objects when light is reflected off the object and enters the eye through the pupil.</p> <p>The pupil changes its size to allow enough, but not too much light into the eye.</p> <p>Too much light damages the eye and too little results in poor quality images.</p>
<p style="text-align: center;">SOUND</p> <p style="text-align: center;">Sound Pitch Volume Vibration Ear drum Frequency Amplitude</p>						

						<p>Sounds have the properties of pitch and volume.</p> <p>Sound travels better through solids than liquids.</p> <p>Sound cannot be heard in a vacuum.</p> <p>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</p> <p>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.</p> <p>Pitch and volume are caused by how the material vibrates</p> <p>Smaller objects or tighter strings tend to vibrate with a higher frequency.</p> <p>Sounds can be represented as a wave.</p>
<p>FORCES</p> <p>Explore and talk about different forces they can feel</p>		<p>PUSHES AND PULLS Cycle A- Summer 1 Cycle B- Summer 1</p>	<p>MAGNETS Cycle B- Autumn 1</p>		<p>FORCES THAT OPPOSE MOTION Cycle B- Autumn 1/Autumn 2</p>	
		<p>motion pushing</p>	<p>magnet force</p>		<p>Water resistance Air resistance</p>	

		pulling slow down speed up direction	attraction repulsion metal non-contact force pole		Friction undulations Interlock Gears Pulley Lever	
		<p>Objects can move (be in Motion) in various ways-roll, slide and bounce</p> <p>The pushing or pulling of an object can affect its motion.</p> <p>Pushing or pulling can do three things, slow down, speed up or change the direction of an object.</p> <p>The larger the push/pull the bigger the effect on motion</p> <p>Compare how things move on different surfaces.</p>	<p>Compare and group together a variety of everyday materials on the basis of whether they attracted to a magnet, and identify some magnetic materials.</p> <p>Magnets exert attractive forces on some metals</p> <p>Magnets don't need to touch</p> <p>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</p> <p>Magnets attract and repel</p> <p>Each end of a magnet is called a pole, opposite poles are called north and south.</p> <p>Magnets exert attractive forces on each other when the poles facing each other are north and south (opposites).</p> <p>Magnets exert repulsive forces on each other when the poles facing each other are the same.</p> <p>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.</p>		<p>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.</p> <p>Gases weigh less than liquids and so water resistance is greater than air resistance.</p> <p>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.</p> <p>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 All of these actions require a force, this is what causes friction</p> <p>Some objects require large forces to make them move;</p>	

					<p>gears, pulley and levers can reduce the force needed to make things move.</p> <p>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.</p> <p>The use of pulleys can reduce the force needed to move things</p>	
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