Cove Junior School

Overview Key Knowledge Science

Building on prior knowledge

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
1	Animal Survival Plants Habitats Seasons Describing materials					
2	Animal Life Cycles New Plants Changing Materials Pushes and Pulls					
3	What do plants need to flourish? *Plants do not eat food so have to make their own. *This food provides then with energy, and materials to grow. *To make the food (sugar) plants need water from the ground, carbon dioxide from the air and light from the sun. *The water is taken up through the roots from the soil	What do I need to flourish? *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	What is a rock? *A rock is a solid material made up of minerals forming part of the surface of the Earth *Rocks are exposed on the surface at cliffs, hills and mountains but are also under the surface. *Some rocks, called ores contain metals *Some rocks are made of grains squashed together and can contain the remains of long-dead organisms, called fossils. This	What is a magnet? *Magnets exert attractive forces on some metals *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 *Each end of a magnet is called a pole; opposite poles are called north and south. *Magnets exert attractive forces on each other when the	What is a skeleton and is it important? *All vertebrates have internal skeletons that protect vital organs. *Invertebrates have exoskeletons that protect vital organs. *Skeletons support the weight of land animals. *Stronger bones can support a greater mass. *Bones are connected (but can move relative to each other) at joints.	What is needed for us to be able to see? *There must be light for us to see. *Light comes from a source. *We need light to see things, even shiny things. *Light from the sun can be dangerous and that there are ways to protect their eyes *If an object is transparent light will go through it and we will be able to see through it.

	*The carbon dioxide is taken in through the leaves *As well as food, plants also make oxygen which is given out back into the air through the leaves	essential to keep our bodies working well and protect us from illnesses. *Humans require a balanced diet to remain healthy but healthy diets vary depending upon the type of activity that humans do.	type of rock is called sedimentary rock, an example would be limestone, sandstone or mudstone. *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 *These three types of rocks all have different properties to each other, including porosity, hardness, reaction to chemicals *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 *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. *Soil also contains humus (rotted plant material)	poles facing each other are north and south (opposites). *Magnets exert repulsive forces on each other when the poles facing each other are the same. *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.	*Muscles connect to bones and move them when they contract. *Stronger bones can anchor stronger muscles.	*If an object is opaque, it will block the light and no light will get through. This is what forms shadows. *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. *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. *If an object is perfectly reflective, light will bounce back off it and we will see reflections of objects. *If the material is translucent, it will allow light through, but we won't be able to see through it.

			*Soil made of very fine rock is called silt or clay.			
4	<u>How does the environment affect the animals that live there?</u> * Living things can be divided into groups based upon their characteristics * Classification keys help group, identify and name living things * 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 * If the population of one organism in the chain or web is affected, it has a knock-on effect to all the others * Mammals, amphibians, insects and birds have different life cycles. *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	<u>Fair Testing</u> * Asking relevant questions and using different types of scientific enquiries to answer them * Setting up simple practical enquiries, comparative and fair tests * Making systematic and careful observations and, where appropriate, taking accurate measurements * Gathering, recording, classifying and presenting data in a variety of ways * Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables * Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	<u>How cold is too cold? How do different materials behave?</u> *Materials can be divided into solids, liquids and gases. *Solids hold their shape unless forced to change. *Liquids flow easily but stay in their container because of gravity. The more viscous a liquid the less runny it is. *Gases move everywhere and are not held in containers by gravity. *Heating causes solids to melt into liquids and liquids to evaporate to gases. *Cooling causes gases to condense to liquids and liquids to freeze to solids. *Different substances change state at different temperatures but the temperatures at which given substances changes state is always the same. *The temperature at which a substance melts from a solid to a	<u>How are devices powered?</u> *Lots of devices are powered by electricity *Electricity comes from a source There are two main sources- batteries and mains *A battery pushes electricity to the device. *To be able to push electricity the battery must be connected to the device using wires *This is called a circuit *If there are more batteries added to a circuit this provides a bigger push on the electricity *This will make the device work harder e.g., brighter bulbs, faster spinning motor, louder buzzer *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. *Other materials will not allow electricity to	<u>What is sound?</u> *Sounds can be produced in a variety of ways. *Sounds have the properties of pitch and volume. *When a sound is produced it spreads out from its source in all directions *Sound is caused by vibration (objects move rapidly back and forth or up and down)	<u>How and what do animals eat?</u> *Different animals require different foods to survive. *Animals get their food from plants and other animals. This can be shown in a food chain. *A food chain begins with a producer. This is often a green plant because plants can make their own food. *A living this that eats other plants is called a consumer. *Humans require a balanced diet to remain healthy but healthy diets vary depending upon the type of activity that humans do. *Humans have 2 sets of teeth in their lifetimes *Humans have three main types of teeth- incisors, canines and molars. *Incisors help to bite off and chew pieces of food. *Canines are used for tearing and ripping food. *Molars help to crush and grind food. * The nutrients in food have to get to every part

	years for sea urchins. Larger animals often have longer life cycles but not always. * All animal life cycles begin with growth and development followed by reproduction. * 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. * 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. * Environmental change affects different habitats differently		liquid is the same at which it freezes from a liquid to a solid. *The temperature at which a substance boils from a liquid to a gas is the same at which it condenses from a gas to a liquid. *Liquids evaporate slowly, even below their boiling temperatures. *The water cycle is the process by which water is continuously transferred between the surface of the earth and the atmosphere. *Liquid water evaporates into water vapor, condenses to form clouds, and precipitates back to earth in the form of rain and snow.	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. *A switch opens and closes a circuit.		of the body. The blood transports them. * 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.
5	<u>How does my body work healthily?</u> *All animals need oxygen to survive. *Air is breathed into the lungs where the oxygen in the air is passed into the blood. *Every part of animals' bodies need oxygen, especially muscles.	<u>What is a life cycle? (plants)</u> *Flowering plants reproduce by the process of pollination *Pollination leads to the formation of a seed which can grow into a new plant *Flowering plants have evolved specific parts	<u>What happens when objects move?</u> *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	<u>Which materials can be dissolved and separated?</u> *A substance is an object with the same properties throughout. *A mixture is when more than one substance is present in the same container	<u>What is a life cycle? (animals)</u> *Mammals, amphibians, insects and birds have different life cycles. *Lifecycles vary in time depending on the species of animal- it can be as short as just a few weeks for	<u>Where is Earth in the solar system?</u> *A Solar system is a collection of planets, which orbit (a curved path) a star. *There are huge number of stars in space and therefore a huge number of solar systems

	*Muscles need a supply of oxygen and sugar (glucose) to make them work, they are supplied by the blood. *The heart is a vital organ pumps blood through the blood vessels. *Blood Vessels are the tubes that blood flows through. *The blood circulates around the body in a way that ensures all muscles in the body get a supply of oxygen and sugar. *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. *The blood then returns to the heart where it is pumped again. *Exercise helps the heart to work more efficiently. *Eating a healthy diet helps to keep the blood vessels from getting blocked. *Avoiding smoking and alcohol puts less stress on the whole	to carry out pollination and seed growth *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 *Flowers have petals also are a range of colours, patterns, and smells to attract insects *Plants and flowers look different because they pollinate in different ways. *There are two types of pollination Insect and wind *Insect pollinated flowers are usually bright coloured and strong scents *Wind pollinated flowers have less colourful petals and much less scent *Plants have evolved many different ways to disperse their seeds *Seed dispersal increases the chances of seeds germinating and growing into a mature plant	material out of the way the greater the resistance. *Gases weigh less than liquids and so water resistance is greater than air resistance. *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. *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 *Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move. *The use of levers can reduce the force	*When a substance is added to a liquid the substance can disappear- this is called dissolving *A mixture of a substance that has dissolved in a liquid is called a solution *Not every substance can dissolve in water *Mixtures can be separated if the substances have different properties *This is because the substances in the mixture are still present and are unchanged *There are different techniques for separating mixtures *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 *Magnets requires the substances to be some magnetic materials and some non-magnet materials to work. *Evaporation requires a solid substance dissolved in water and the solid has a higher boiling point in water to work.	insects, to up to 200 years for sea urchins. Larger animals often have longer life cycles but not always. *All animal life cycles begin with growth and development followed by reproduction. *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. *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.	*Our solar system consists of 8 planets, many of those planets have moons which orbit around them. *Earth's moon is not a planet but is a satellite which orbits Earth. It is around a quarter of the size of Earth. *As the Moon orbits the 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. *The Moon doesn't emit (give off) light itself, the 'moonlight' we see is actually the Sun's light reflected off the lunar surface. *Our solar system can be represented with a model (see diagram), but it isn't possible to draw it to scale. *The planets and moons are rotating (spinning) *The time it takes one planet to rotate is called a day. On Earth this is 24 hours *The time it takes a planet to complete one orbit around its star is called a year. On Earth this is 356.25 days *The solar system is with a massive collection of

	system and keeps it healthier. *Describe the changes as humans develop to old age. (PSHE) *The nutrients in food have to get to every part of the body. The blood transports them. *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.	*A seed contains a miniature, undeveloped version of the plant *They contain a food store for the first stage of growth (until the plant can make its own food) *They are surrounded with a protective coat.	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. *The use of pulleys can reduce the force needed to move things	*Floating requires some substances to float and some substances to sink to work. *All matter, including gas, has mass. *Sometimes, mixed substances react to make a new substance. These changes are usually irreversible. *Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible. *Indicators that something new has been made are the properties of the material are different (colour, state, texture, hardness, smell, temperature) *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)		stars called the galaxy (called the Milky way) *The Milky way is one of billions of galaxies in the Universe. *Stars are huge balls of gas that produce vast amounts of light and heat. *Asteroids are lumps of rock that orbit a star (there are millions in between Mars and Jupiter) *Comets are objects that are made of Ice, which melts when they get closer to the sun leaving a tail. *Gravity is force of attraction between two objects with mass (a quantity of matter) *The bigger the mass the bigger force it exerts *Gravity works over distance but gets weaker as distance increases *Stars, planets, moons have a very large amount of mass. They exert a gravitational attraction on each other *Differences in gravity result in smaller mass objects orbiting around lager mass objects, e.g., planets around stars and moons around planets

6	How does electricity work? *Current is the flow of electricity around a circuit. *The power supply in a circuit pushes the current round the circuit *The voltage of the power supply is a measure of this push *Voltage is measure in volts *Batteries have a limited store of energy and when this is gone, they can no longer push the current *Current is the flow of electricity through a conductor *When current passes through a device it makes it work *Increasing the voltage (the number of cells in the battery) increases the current. The larger the flow of current, the harder the device works *All parts of a circuit offer resistance to electrical current including the wires. *Resistance is the slowing down of electrical current *The more devices added into a circuit the greater the resistance	How do we change the pitch and volume of sound change? *Sounds can be produced in a variety of ways. *Sounds have the properties of pitch and volume. *When a sound is produced it spreads out from its source in all directions *Sound is caused by vibration (objects move rapidly back and forth or up and down) *When objects vibrate it makes the objects in contact with it also vibrate. This includes the air. *The vibration travels through the air and makes other objects it is in contact with vibrate including your ear drum. *Pitch and volume are caused by how the material vibrates *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 *Smaller objects or tighter strings tend to vibrate with a higher frequency	How does a habitat affect which animals or plants can survive there? *All living (and extinct) organisms are classified into groups based upon their physical features. *This includes animals, plants, fungi, and microorganisms like bacteria. *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. *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.	How does light travel? *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. *Shadows form when light hits an opaque object. The area behind the object is in darkness because light can only travel in straight lines. *Shadows have the same shape as the objects that cast them. *When light hits a transparent object, it goes through it in a straight line so we can see a clear image through it. *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. *When light hits a mirrored surface, it reflects off it in straight lines, so we can see an image in the reflective material. *Sometimes when light hits a material it reflects off it in many different directions (it is scattered). In this	How do we know evolution happens? *The Earth is very old. Around 4.2 billion years. We know this from dating rocks *Life first appeared on Earth around 3.8 billion years ago. *Life was, at first, very simple but over millions and millions of years life became more complex through the process of evolution *There are many sources of evidence for evolution *Fossils are one of the main sources of evidence for evolution. They show when new organisms appear and when they go extinct. *Due to the nature of fossil formation and discovery, fossils only provide an incomplete record of evolution. *Scientists use fossils along with other pieces of evidence (DNA, Embryology, comparative anatomy, artificial selection) to work out how organisms have evolved *Fossils form when dead organisms are rapidly buried or leave an imprint and are turned to stone over a long period	How does our body work? *All animals need oxygen to survive. *Air is breathed into the lungs where the oxygen in the air is passed into the blood. *The heart is a vital organ pumps blood through the blood vessels. *Blood Vessels are the tubes that blood flows through. *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. *The blood then returns to the heart where it is pumped again. *Exercise helps the heart to work more efficiently.

	*This means less current flows around the circuit	*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. *Sounds get fainter as the distance from the sound source increases.		case light will be reflected but no image will be seen in the material. *Shiny surfaces are better reflectors and rough surfaces scatter light more. Opaque objects don't allow any light to pass through them *Animals see objects when light is reflected off the object and enters the eye through the pupil. *The pupil changes its size to allow enough, but not too much light into the eye. *Too much light damages the eye and too little results in poor quality images.	of time. If they survive in the Earth, they then have to be found by a palaeontologist who will study them. *Evolution is the change of physical form in a population over a long-time span *Natural selection is the process which controls that change. *In any population there is variation and competition for resources (food, water, mates). *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. *Over a long enough timeline all organisms in a population will have those successful features. *This is known as the Theory of Evolution by Natural Selection and was developed by Charles Darwin in 1859 *Before Darwin, Lamarck's Idea of	

					acquired characteristics was proposed. (Giraffes stretch their necks in life, which made their children have longer necks). *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	