
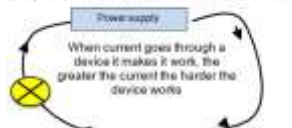
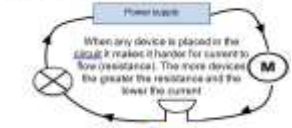
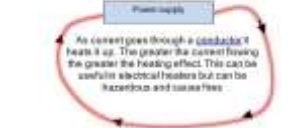

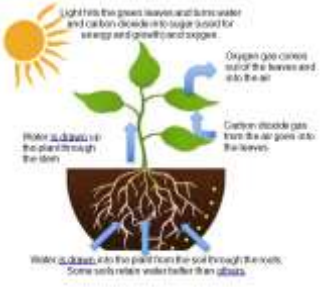






Knowledge Organiser Science overview



Year 3	Knowledge taught in unit / knowledge organiser	Year 4	Knowledge taught in unit / knowledge organiser	Year 5	Knowledge taught in unit / knowledge organiser	Year 6	Knowledge taught in unit / knowledge organiser
Unit title		Unit title		Unit title		Unit title	
Animals including humans	<p>Chapter 1: Skeletons protect vital organs</p> <ul style="list-style-type: none"> All vertebrates have internal skeletons that protect vital organs. Invertebrates have exoskeletons that protect vital organs <p>Chapter 2: Skeletons support weight</p> <ul style="list-style-type: none"> Skeletons support the weight of land animals. Stronger bones can support more weight <p>Chapter 3: Skeletons support movement</p> <ul style="list-style-type: none"> Bones are connected (but can move relative to each other) at joints. Muscles connect to bones and move them when they contract. Stronger bones can anchor stronger muscles 	Animals including humans	<p>Chapter 1: Food groups.</p> <ul style="list-style-type: none"> Animals need a variety of foods to help them grow and survive. The main food groups are: <ul style="list-style-type: none"> Meat, dairy and pulses to provide protein for muscles. Grains and root vegetables to 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>Chapter 2: Variation in animals diet.</p> <ul style="list-style-type: none"> Different animals require different foods to survive. Humans require a balanced diet to remain healthy but healthy diets vary depending upon the type of activity that humans do. <p>Chapter 3: How humans digest food.</p> <ul style="list-style-type: none"> 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. Humans achieve this as below: 	Properties and changes of materials.	<ul style="list-style-type: none"> It is possible to change materials into completely different ones. This is very important because new substances might have different properties to materials we currently have. For example plastics can be moulded into intricate shapes, are waterproof, strong and electrical insulators. When materials are heated or mixed with other materials they sometimes can be made to turn into new materials. The question is how would we know if it was a new material or the same material mixed differently? Indicators that something new has been made are: <ul style="list-style-type: none"> The properties of the material are different (colour, state, texture, hardness, smell, temperature) 2. If it is not possible to get the material back easily it is likely that it is not there any more and something new has been made (irreversible change) 	Electricity	<p>Chapter 1: Pushing electrical current</p>  <p>Chapter 2: Electrical current makes devices work</p>  <p>Chapter 3: All devices resist current</p>  <p>Chapter 4: Electrical current has a heating effect</p> 
Light	<p>Chapter 1: Light and sight</p> <ul style="list-style-type: none"> We can only see things when there is light and the light had to come from somewhere. All light originally comes from a light source <p>Chapter 2: What light does when it hits materials</p> <ul style="list-style-type: none"> When light hits an object it can do a number of things If the object is transparent it will go through it and we will be able to see through it. If the object is opaque it will block the light and no light will get through. If the 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. 	Adaptation.	<p>Chapter 1</p> <ul style="list-style-type: none"> 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. <p>Chapter 2</p> <ul style="list-style-type: none"> Environmental change (the seasons, human activity, climate change) affects different organisms differently and therefore different habitats differently because all organisms in a habitat are interdependent. 	Forces	<p>Chapter 1: Water and air resistance.</p> <ul style="list-style-type: none"> 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. Gases weigh less than liquids and so water resistance is greater than air resistance <p>Chapter 2: Friction.</p> <ul style="list-style-type: none"> 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. 	Sound	<p>Chapter 1: Describing sounds</p> <ul style="list-style-type: none"> Sounds can be made in many different ways and individual sounds have the properties of pitch and volume. When a sound is made it immediately spreads out in all directions. As it travels its volume decreases but its pitch remains the same. <p>Chapter 2: How sounds are made and travel.</p> <ul style="list-style-type: none"> Sound is made when an object is made to vibrate (move backwards and forwards or up and down). As the material vibrates it makes whatever it is in contact with vibrate, including air. As the air vibrates it makes whatever it is in contact with vibrate also, which might be a wall or even your eardrum. Sound moves through materials vibrating making other materials they are in contact with vibrate.

				 <ul style="list-style-type: none"> To move one interlocking surface over another one of three things must happen: <ol style="list-style-type: none"> The surfaces must rise slightly The bumps on the surface must bend The bumps on the surface must break <p>All of these actions requires</p> <p>Chapter 3: Managing forces. Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move.</p> <p>(These are particularly complex ideas. It might be better to teach them through a design technology project where children make toys using cogs, pulleys and levers)</p>		<p>Chapter 3: Why does pitch and volume change?</p> <ul style="list-style-type: none"> Pitch and volume are determined by how the material vibrates: <ul style="list-style-type: none"> Pitch is determined by how fast an object vibrates, i.e. the frequency of vibration. The higher the frequency the higher the pitch. Volume is determined by how big the movement of each vibration is (the amplitude of vibration). The bigger the amplitude the higher the volume. Smaller objects and tighter strings and surfaces tend to vibrate with a higher frequency 	
Plants	<p>Chapter 1: Plants don't eat.</p> <ul style="list-style-type: none"> Plants don't eat and so have to make their own food to provide them with energy and material to grow. <p>The model of how plants grow</p> <ul style="list-style-type: none"> Plants turn water from the ground and carbon dioxide from the air into sugar, which is used for energy and making new material to grow. 	Electricity	<p>Chapter 1: Electrical power sources.</p> <ul style="list-style-type: none"> Lots of devices are powered by electricity; these need a source of electricity, which could be mains or battery. <p>Chapter 2: What batteries do.</p> <ul style="list-style-type: none"> The battery's job is to push electricity to the device, but it needs something to carry the electricity all the way from the supply to the device, this is what we call a circuit <p>Chapter 3: Making devices work harder.</p> <ul style="list-style-type: none"> If there are more batteries they push harder and so the device will work harder e.g. brighter or faster. <p>Chapter 4: Insulators and conductors.</p> <ul style="list-style-type: none"> However not everything can carry the electricity from the source to the device, some materials allow the electricity through (conductors) and others don't (insulators) 	Earth in Space	<p>Chapter 1: Where the Earth is in space</p> <ul style="list-style-type: none"> The universe is vast and contains billions of stars. The solar system is a collection of planets and moons orbiting our nearest star, the sun. It can be represented using a model. All objects in the solar system are spinning as well as orbiting. The time it takes for an object to spin once is called a day The time it takes a planet to orbit the sun is called a year <p>Chapter 2: Stars and other objects</p> <ul style="list-style-type: none"> Stars produce vast amounts of heat and light. All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of star <p>Chapter 3: Gravity and its effects</p> <ul style="list-style-type: none"> Gravity is a force of attraction between any two things that have mass and bigger masses exert bigger forces. Gravity works over a distance but gets weaker as the distance increases. Stars, planets and moons have so much mass they exert a large gravitational attraction on other things, including each other. Differences in gravity result in smaller mass objects like planets (or moons) orbiting larger mass objects like stars (or planets) 	Evolution and inheritance.	<p>Chapter 1: Evolution happens.</p> <ul style="list-style-type: none"> Over the last many millions of years there are many examples of organisms becoming extinct and others evolving into new organisms over many generations. The fossil record provides evidence for this. <p>Chapter 2: Fossils provide evidence for evolution.</p> <p>The way fossils form and are found mean the fossil record is an incomplete record of all evolution. Scientists have had to piece together evidence to work out how organisms evolve.</p> <p>Chapter 3: How does evolution happen?</p>  <p>Darwin's theory of Natural Selection explains how evolution occurs. It can be simplified in the flow chart.</p> <ul style="list-style-type: none"> Some organisms reproduce sexually where offspring inherit information from both parents, others reproduce asexually by making a copy of a single parent. A sexual reproduction results in little variation in a population that makes evolution less likely. <p>Chapter 3: Why are life cycles so different? All living things have similar stages of life.</p>
Properties and changes of materials.	<p>Chapter 1: What are mixtures?</p> <ul style="list-style-type: none"> When more than one substance are present in the same container it is called a mixture <p>Chapter 2: What does dissolving mean?</p> <ul style="list-style-type: none"> When a substance is added to a liquid it has dissolved if no bits of the substance can be seen and the liquid is transparent. This mixture is called a solution. Not all substances dissolve in water. (Always be aware that if too much substance is added it may appear as if it hasn't dissolved but some may have, so add small quantities) <p>Chapter 3: Deciding how to separate mixtures.</p> <ul style="list-style-type: none"> All mixtures can be separated if they have a difference in property. This is because both (or all) of the materials are still present. See below 	Living things in their habitats	<p>Chapter 1</p> <ul style="list-style-type: none"> In any habitat there are food chains and webs where nutrients are passed from one organism to another when it is eaten. <p>Chapter 2</p> <ul style="list-style-type: none"> Environmental change (the seasons, human activity, climate change) affects different organisms differently and therefore different habitats differently because all organisms in a habitat are interdependent. 	Living things in their habitats	<ul style="list-style-type: none"> Know that animals can be grouped into mammals, reptiles, birds, fish and amphibians. Describe the habitats in which different animals and plants are found. Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals Give reasons for classifying plants and animals based on specific characteristics. Explain how living things are adapted to different habitats. 	Animals including humans	<p>Chapter 1: Getting oxygen into the blood.</p> <p>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. Muscles need a supply of oxygen and sugar to make them work, they are supplied this by the blood.</p> <p>Chapter 2 –see below</p>

	<table border="1"> <tr> <td>Separating technique</td> <td>Difference in property required</td> </tr> <tr> <td>Filtration and sieving</td> <td>A solid that does not dissolve in a liquid. Different sized solid bits.</td> </tr> <tr> <td>Magnets</td> <td>Some materials magnetic others not</td> </tr> <tr> <td>Evaporation</td> <td>A solid dissolved in water and the solid has a high boiling temperature</td> </tr> <tr> <td>Flotation</td> <td>Some materials float and other sink</td> </tr> </table>	Separating technique	Difference in property required	Filtration and sieving	A solid that does not dissolve in a liquid. Different sized solid bits.	Magnets	Some materials magnetic others not	Evaporation	A solid dissolved in water and the solid has a high boiling temperature	Flotation	Some materials float and other sink					<p>The blood circulation model</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> 
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Rocks	<p>Chapter 1 Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</p> <p>Chapter 2</p> <p>B: describe in simple terms how fossils are formed when things that have lived are trapped within rock</p> <p>Chapter 3</p> <p>C: recognise that soils are made from rocks and organic matter</p>	Plants	<p>Chapter 1: Reproductive parts of a flowering plant</p> <ul style="list-style-type: none"> Flowering plants have evolved specific parts to carry out pollination, fertilisation and seed growth. Coloured and scented petals and attract insects Stamen hold pollen Stigma collect pollen Ovaries contain eggs that grow into seeds when pollen from the male moves down the stigma. <p>Chapter 2: All flowers are similar but different</p> <ul style="list-style-type: none"> All flowering plants reproduce by pollen from the male reaching the stigma of the female. However all plants look slightly different because they pollinate in different ways. Most plants use insects to pollinate and so have colourful petals and strong scents, a few plants use the wind, these often have less colourful petals and little scent. <p>Chapter 3: Seed dispersal</p> <ul style="list-style-type: none"> Plants have evolved many different ways to disperse their seeds. Seed dispersal increase the chances of the seeds germinating and growing into mature plants <p>Chapter 4: What does a seed do?</p> <ul style="list-style-type: none"> Seeds and bulbs need the right conditions to germinate. They contain a food store for the first stages of growth (i.e. until the plant is able to produce its own food through its leaves) 	Animals including humans	<ul style="list-style-type: none"> Identify the stages in the human life cycle. All animals eventually die Animals reproduce new animals when they reach maturity. Animals grow until they reach maturity and then do not grow any longer. 	Light	<p>Chapter 1: How light travels</p> <ul style="list-style-type: none"> 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 is in darkness because light can only travel in straight lines <p>Chapter 2: How light behaves when it hits objects</p> <ul style="list-style-type: none"> 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. Some times 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. Shiny surfaces are better reflectors and rough surfaces scatter light more. Opaque objects don't allow any light to pass through them. <p>Chapter 3: How we see.</p> <p>*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.</p>									
Forces- magnets	<p>Chapter 1: What magnets do.</p> <ul style="list-style-type: none"> Magnets exert attractive forces on some metals <p>Chapter 2: Magnets don't need to touch.</p> <ul style="list-style-type: none"> 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>Chapter 3: Magnets attract and repel.</p> <ul style="list-style-type: none"> 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 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. <p>Chapter 4: What affects magnetic strength?</p> <ul style="list-style-type: none"> The strength of magnetic forces are affected by: <ul style="list-style-type: none"> The strength of the magnet. The distance between the magnet and the object. The material the object is made from. 	Properties and changes of materials	<p>Chapter 1: Properties of solids, liquids and gases.</p> <ul style="list-style-type: none"> 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. <p>Chapter 2: Changing state.</p> <ul style="list-style-type: none"> 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. <p>Chapter 3: Melting, freezing, boiling and condensation temperatures.</p> <ul style="list-style-type: none"> Different substance change state at different temperatures but the temperatures at which given substances change state are always the same. <p>Chapter 4 What happens at the melting temperature?</p> <ul style="list-style-type: none"> 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. 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. 													

			<ul style="list-style-type: none"> Liquids evaporate slowly, even below their boiling temperatures. 				
LONGITUDINAL STUDY	Children should raise and explore questions that demand the identification and classification of creatures and plants in their local environment (insects, spiders, birds, mammals, reptiles and amphibians). Questions should require children to consider how environmental change (the seasons, human activity, climate change) affects different organisms within their environment differently and therefore different habitats differently because all organisms in a habitat are interdependent.	LONGITUDINAL STUDY	Children should raise and explore questions that demand the identification and classification of creatures and plants in their local environment (insects, spiders, birds, mammals, reptiles and amphibians). Questions should require children to consider how environmental change (the seasons, human activity, climate change) affects different organisms within their environment differently and therefore different habitats differently because all organisms in a habitat are interdependent.				