



Grimsargh St Michael's CE Primary School

Science progression of knowledge- KS2 (themes/topics/units)

This progression of knowledge/skills document details how each key topic develops sequentially in Science throughout school. (Please refer to KLIPS documents for notes and non–statutory guidance which supplements each area and links units to the relevant working scientifically areas).

Areas of study	Year 3	Year 4	Year 5	Year 6
Seasonal Changes (Nature Journal)	There should be plenty of opportunities throughout the year for children to use the school/local environment to observe plant lifecycles with a particular focus on the different parts of a plant (e.g. comparing fruits and seeds and looking for examples of pollination). This could be done through an ongoing/monthly nature journal to observe, record and review over a period of time.	There should be plenty of opportunities throughout the year for children to use the school/local environment to observe and identify how a habitat changes. This could include a focus on the relationships between the plants and animals within a habitat. This could be done through an ongoing/monthly nature journal to observe, record and review over a period of time.	There should be plenty of opportunities throughout the year for children to use the school/local environment to observe and identify a variety of plant and animal life cycles. This could be done through an ongoing/monthly nature journal to observe, record and review a variety of examples over a period of time. The unit on 'Human life cycles' can be linked to PSHEE work on 'Relationships' and the Year 5 Science unit 'Habitats and life cycles' rather than being taught as a separate unit.	There should be plenty of opportunities throughout the year for children to use the school/local environment to observe and identify a variety of plants and animals that live there focusing on their adaptations for survival. This could be done through an ongoing/monthly nature journal to observe, record and review a variety of examples over a period of time and would support their learning and wider research in the 'Living Things and Their Habitats' unit and the 'Evolution and Inheritance' unit.
Animals Including Humans	Identify that humans and some other animals have skeletons and muscles for support, protection and movement. Identify animals (vertebrates) which have a skeleton which supports their body, aids movement & protects vital organs (be able to name some of the vital organs). Identify animals without internal skeletons/backbones (invertebrates) and describe how they have adapted other ways to support themselves, move & protect their vital organs. Know how the skeletons of birds, mammals, fish, amphibians or reptiles are similar (backbone, ribs, skull, bones used for movement) and the differences in their skeletons. Know that muscles, which are attached to the skeleton, help animals move parts of their body. Explore how humans grow bigger as they reach maturity by making comparisons linked to body	Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions. Construct and interpret a variety of food chains, identifying producers, predators and prey. Describe how teeth and gums have to be cared for in order to keep them healthy.	Describe the changes as humans develop to old age. Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire and excrete.	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans. The heart is a major organ and is made of muscle. The heart pumps blood around the body through vessels and this can be felt as a pulse. The heart pumps blood through the lungs in order to obtain a supply of oxygen. Blood carries oxygen/essential materials to different parts of the body. During exercise muscles need more oxygen so the heart beats faster and our breathing and pulse rates increase. Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire and excrete.

	<p>proportions and skeleton growth – e.g. do people with longer legs have longer arm spans?</p> <p>Recognise that animals are alive; they move, feed, grow, use their senses and reproduce.</p>			
Health – how we grow and stay healthy	<p>Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.</p> <p>An adequate and varied diet is beneficial to health (along with a good supply of air and clean water). Regular and varied exercise <i>from a variety of different activities</i> is beneficial to health (focus on <i>energy in versus energy out</i>. Include information on making informed choices).</p>			<p>An adequate, varied and balanced diet is needed to help us grow and repair our bodies (proteins), provide us with energy (fats and carbohydrates) and maintain good health (vitamins and minerals). Tobacco, alcohol and other ‘drugs’ can be harmful. All medicines are drugs, not all drugs are medicines.</p>
Materials (properties of)	<p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p> <p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</p> <p>Recognise that soils are made from rocks and organic matter.</p> <p>Rocks and soils can feel and look different. Rocks and soils can be different in different places/environments.</p>	<p>Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>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).</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p> <p>Solids, liquids and gases can be identified by their observable properties.</p> <p>Solids have a fixed size and shape (the size and shape can be changed but it remains the same after the action).</p> <p>Liquids can pour and take the shape of the container in which they are put.</p> <p>Liquids form a pool not a pile.</p> <p>Solids in the form of powders can pour as if they were liquids but make a pile not a pool.</p> <p>Gases fill the container in which they are put.</p> <p>Gases escape from an unsealed container.</p> <p>Gases can be made smaller by squeezing/pressure.</p> <p>Liquids and gases can flow.</p>	<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. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p> <p>Compare a variety of materials and measure their effectiveness (e.g. hardness, strength, flexibility, solubility, transparency, thermal conductivity, electrical conductivity).</p> <p>Temperature and Thermal Insulation</p> <p>Heat always moves from hot to cold.</p> <p>Some materials (insulators) are better at slowing down the movement of heat than others.</p> <p>Objects/liquids will warm up or cool down until they reach the temperature of their surroundings.</p>	
Material Changes (reversible +			<p>Reversible</p> <p>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p>	

<p>irreversible changes)</p>			<p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Demonstrate that dissolving, mixing and changes of state are reversible changes. Changes can occur when different materials are mixed. Some material changes can be reversed and some cannot. Recognise that dissolving is a reversible change. Distinguish between melting and dissolving. Mixtures of solids (of different particle size) can be separated by sieving. Mixtures of solids and liquids can be separated by filtering if the solid is insoluble (un-dissolved). Evaporation helps us separate soluble materials from water. Changes to materials can happen at different rates (factors affecting dissolving, factors affecting evaporation – amount of liquid, temperature, wind speed). Freezing, melting and boiling changes can be reversed (revision from YR4). Irreversible Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning, and the action of acid on bicarbonate of soda.</p>	
<p>Environment Living Things and Their Habitats (Animals – other animals)</p> <p>Observing life cycles</p>		<p>Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things. Use and make identification keys for plants and animals.</p>	<p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproduction in some plants and animals.</p>	<p>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. Living things can be grouped into micro-organisms, plants and animals. Vertebrates can be grouped as fish, amphibians, reptiles, birds and mammals. Invertebrates can be grouped as snails and slugs, worms, spiders and insects. Plants can be grouped as flowering plants (incl. trees and grasses) and non-flowering plants (such as ferns and mosses).</p>

Environment (evolution and inheritance)				<p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</p> <p>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>
Plants	<p>Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.</p> <p>Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.</p> <p>Investigate the way in which water is transported within plants.</p> <p>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> <p>Roots grow downwards and anchor the plant.</p> <p>Water, taken in by the roots, goes up the stem to the leaves, flowers and fruit.</p> <p>Nutrients (not food) are taken in through the roots.</p> <p>Stems provide support and enable the plant to grow towards the light.</p> <p>Plants make their own food in the leaves using energy from the sun.</p> <p>Flowers attract insects to aid pollination.</p> <p>Pollination is when pollen is transferred between plants by insects, birds, other animals and the wind.</p> <p>Fertilisation occurs in the ovary of the flower.</p> <p>Seeds are formed as a result of fertilisation.</p> <p>Many flowers produce fruits which protect the seed and/or aid seed dispersal.</p> <p>Seed dispersal, by a variety of methods, helps ensure that new plants survive.</p>			

	Plants need nutrients to grow healthily (either naturally from the soil or from fertiliser added to soil).			
Electricity		<p>Identify common appliances that run on electricity.</p> <p>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</p> <p>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.</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors.</p> <p>Electricity can be dangerous.</p> <p>Electricity sources can be mains or battery.</p> <p>Batteries 'push' electricity round a circuit and can make bulbs, buzzers and motors work.</p> <p>Faults in circuits can be found by methodically testing connections.</p> <p>Drawings, photographs and diagrams can be used to represent circuits (although standard symbols need not be introduced until UKS2).</p>		<p>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</p> <p>Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</p> <p>Use recognised symbols when representing a simple circuit in a diagram.</p> <p>Circuit diagrams can be used to construct a variety of more complex circuits predicting whether they will 'work'.</p>
Forces and Magnets	<p>Compare how some things move on different surfaces.</p> <p>Notice that some forces need contact between two objects but magnetic forces can act at a distance.</p> <p>Observe how magnets attract or repel each other and attract some materials and not others.</p> <p>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.</p> <p>Describe magnets as having two poles.</p> <p>Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>		<p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>Identify the effects of air resistance, water resistance and friction that act between moving surfaces.</p> <p>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p> <p>There are different types of forces (push, pull, friction, air resistance, water resistance, magnetic forces and gravity).</p> <p>Gravity can act without direct contact between the Earth and an object.</p> <p>Friction, air resistance and water resistance are forces which slow down moving objects.</p>	

			<p>Friction, air resistance and water resistance can be useful or unwanted.</p> <p>The effects of friction, air resistance and water resistance can be reduced or increased for a preferred effect.</p> <p>More than one force can act on an object simultaneously (either reinforcing or opposing each other).</p>	
Light and Astronomy	<p>Recognise that they need light in order to see things and that dark is the absence of light.</p> <p>Notice that light is reflected from surfaces.</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</p> <p>Recognise that shadows are formed when the light from a light source is blocked by a solid object.</p> <p>Find patterns in the way that the size of shadows change.</p>		<p>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</p> <p>Describe the movement of the Moon relative to the Earth.</p> <p>Describe Sun/Earth/Moon as approximately spherical bodies.</p> <p>Use the idea of the Earth's rotation to explain day and night.</p> <p>The Earth spins once around its own axis in 24 hours, giving day and night.</p> <p>The Earth orbits the Sun in one year.</p> <p>We can see the Moon because the Sun's light reflects off it.</p> <p>The Moon orbits the Earth in approximately 28 days and changes to the appearance of the moon are evidence of this.</p> <p>The Sun appears to move across the sky from East to West and this causes shadows to change during the day.</p> <p>Changes to shadow length over a day or changes to sunrise and sunset times over a year are evidence supporting the movement of the Earth.</p>	<p>Recognise that light appears to travel in straight lines.</p> <p>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.</p> <p>Explain that we see things because the light that travels from light sources to our eyes or from light sources to objects and then to our eyes.</p> <p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p>
Sound		<p>Vibrations</p> <p>Identify how sounds are made, associating some of them with something vibrating.</p> <p>Recognise that vibrations from sounds travel through a medium to the ear.</p> <p>Find patterns between the volume of a sound and the strength of the vibrations that produced it.</p> <p>Recognise that sounds get fainter as the distance from the sound source increases.</p> <p>Sounds can be made in a variety of ways (pluck, bang, shake, blow) using a variety of things (instruments, everyday materials, body).</p> <p>Sounds travel away from their source in all directions.</p>		

		<p>Vibrations may not always be visible to the naked eye.</p> <p>Pitch: Find patterns between the pitch of a sound and features of the object that produced it. Sounds can be high or low pitched. The pitch of a sound can be altered. Pitch can be altered either by changing the material, tension, thickness or length of vibrating objects or changing the length of a vibrating air column.</p> <p>Muffling/blocking sounds: Recognise that vibrations from sounds travel through a medium to the ear. Sounds are heard when they enter our ears (although the structure of the ear is not important key learning at this age phase). Sounds can travel through solids, liquids and air/gas by making the materials vibrate. Sound travel can be reduced by changing the material that the vibrations travel through. Sound travel can be blocked.</p>		
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