

Year 4 Science Medium Term Plan

<p>Y4</p>	<p><u>Animals Including Humans</u></p> <p>This unit is where pupils study animals, including humans, as part of the discipline of biology - the study of living organisms. Pupils have a secure knowledge of life cycles and what animals, including humans, need to survive.</p> <p>Pupils know the importance of a healthy lifestyle, including a balanced diet and the effects of sugar, the food groups and their role in human development. Pupils can identify and name a variety of animals. Pupils know that humans and some other animals have skeletons and muscles for support, protection and movement.</p> <p>In this Year 4 unit, pupils learn about the simple functions of the basic parts of the digestive system in humans. New learning includes identifying the different types of teeth in humans and their simple functions. Pupils construct and interpret a variety of food chains, identifying producers, predators and prey.</p> <p>This unit is the precursor to work in year 5 as pupils learn about puberty and gestation periods of animals. The knowledge acquired in this unit will help pupils in Year 6 to learn about the circulatory system and dental structures.</p>	
<p>National Curriculum (End of Unit Outcomes)</p>	<p>Sequence of Learning (small steps)</p>	<p>Key skills – Working Scientifically</p>
<p>Describe the simple functions of the basic parts of the digestive system in humans</p>	<ul style="list-style-type: none"> - To identify the main parts of the digestive system. - To know that food passes through the body with nutrients being extracted and waste products being excreted and that this process is known as digestion. -To sequence the main parts of the digestive system when explaining what happens to food in human bodies. -To know that the process of digestion involves breaking food into small parts that can be absorbed by the body. 	
<p>Identify the different types of teeth in humans and their simple functions</p>	<ul style="list-style-type: none"> -To know that the process of digestion begins with food being chewed by the teeth with saliva added. -To identify the 4 types of teeth in humans – incisors, canines, molars and premolars – and talk about their shape. -To describe the functions of the different tooth types: incisors slice, canines tear and molars grind. - To explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding. -To compare the teeth of humans with animals and suggest reasons for differences between carnivore and herbivore teeth. -To understand that enamel acts as a protective layer around the tooth. 	<p><u>Identifying, Classifying and Grouping</u></p> <p>Compare and contrast different types of teeth. Report findings using drawings and labelled diagrams. WS 6</p> <p>Comparing the teeth of carnivores and herbivores. Identify dinosaurs as herbivores, carnivores or omnivores based on their teeth. WS 8</p> <p><u>Observing Over Time</u></p> <p>Look at how sugar can damage teeth over time and consider how we can keep our teeth healthy. White Rose – Tooth decay experiment</p>

<p>Construct and interpret a variety of food chains, identifying producers, predators and prey</p>	<p>-I know what a carnivore, herbivore and omnivore is and identify these.</p> <p>-To know that the arrows in a food chain show the direction that energy is travelling.</p> <p>-To know that all energy in a food chain initially comes from the sun which is absorbed and turned into energy by plants (producers).</p> <p>-To know that an animal that is eaten by another is called prey and that an animal that eats other animals is called a predator.</p> <p>- To construct 3 and 4 step (up to tertiary consumer) food chains using my knowledge (from observation, research etc) of what an animal eats.</p>	<p>Researching Researching what different animals eat within a specific environment, e.g. coral, polar, African grasslands, to construct food Chains and present what has been found or learned. WS 4</p>
<p>Vocabulary</p>	<p>digestive system, nutrition, nutrients, stomach, small intestine, large intestine, rectum, anus, mouth</p> <p>mouth, teeth, canines, Incisor, Molar, pre-molar, saliva, tongue, rip, tear, chew, grind, cut</p> <p>carnivore, herbivore, omnivore, producer, consumer, predator, prey, food chain</p>	
<p>Common Misconceptions</p>	<p>Some children may think: - - arrows in a food chain mean 'eats'</p> <ul style="list-style-type: none"> - the death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain - there is always plenty of food for wild animals - your stomach is where your belly button is - food is digested only in the stomach - when you have a meal, your food goes down one tube and your drink down another - the food you eat becomes "poo" and the drink becomes "wee" 	
<p>Key Questions</p>	<ul style="list-style-type: none"> - What is digestion? - What organs are in the digestive system? - How are carnivore/herbivore/omnivore teeth suited to their diet? - Can you name the 4 types of teeth? - How are the types of teeth different? 	

<p>Y4</p>	<p><u>States of Matter</u></p> <p>This unit is the fourth of five science units where pupils study materials as part of the discipline of chemistry - the identification of the properties a substance is made from. It is also the study of forces as part of the discipline of physics – the study of the processes that shape our world and how we use it.</p> <p>Pupils have a secure knowledge of the properties of materials and can identify and compare the suitability of a variety of everyday materials. Previous learning includes comparing how things move on different surfaces and pupils know that squashing, bending, twisting and stretching can change the shapes of some solid objects.</p> <p>This year 4 unit builds on pupils’ knowledge of properties of materials as pupils learn about states of matter. Pupils compare and group materials together, according to whether they are solids, liquids or gases. New learning includes 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). Pupils. The knowledge acquired during this unit will help pupils understand the water cycle in geography: the part played by evaporation and associate the rate of evaporation with temperature.</p> <p>This unit is the precursor to work studied in Year 5 pupils learn about dissolving, mixing and changes of state, and reversible and irreversible changes.</p>	
<p>National Curriculum (End of Unit Outcomes)</p>	<p>Sequence of Learning (small steps)</p>	<p>Key skills – Working Scientifically</p>
<p>Compare and group materials together, according to whether they are solids, liquids or gases</p>	<p>-To know that things are composed of a matter commonly in one of three states of matter: solid, liquid or gas.</p> <ul style="list-style-type: none"> -To explore a variety of materials and describe their states of matter. -To understand and explain that a solid holds its shape. -To understand and explain that a liquid will change its shape to fit the container and can be poured. They will form a level surface within a container. -To explore objects like sand and identify how they can be confused for a liquid (fill a container and can pour) but explain how they form a heap and do not keep a level surface and that each grain of sand would show the properties of a solid. -To understand and explain that a gas fills the space but has no fixed shape. They would also escape from an unsealed container. 	<p>Classifying Group and classify different materials based on their state of matter. WS 4</p> <p>Make careful observations about different states of matter. WS 3</p> <p>Identify differences between materials/items of different states of matter WS 8</p>
<p>Observe that some materials</p>	<p>-To know that materials can change state when the temperature changes.</p>	<p>Observing Observe water as a solid, liquid and gas and note the changes when it is heated or cooled. WS 3</p>

<p>change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</p>	<ul style="list-style-type: none"> -To know that melting is a state change from a solid to a liquid. -To know that freezing is a state change from liquid to solid. (The opposite of melting). -To know that the freezing point of water is 0oC -To know that boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature. -To know that water boils at 100oC -To know that evaporation is the same state change as boiling (liquid to gas) but that this happens slowly and at a lower temperature from the surface of the liquid. -To identify the link between higher temperatures and evaporation rates. -To know that condensation is the change from a gas back to a liquid caused by cooling. 	<p><i>(This could be done through observing puddles over time or washing drying on a line.)</i></p> <p><u>Comparative/fair testing and Pattern seeking</u> What affects melting rate of chocolate/ice? What affects rate of evaporation? Note: teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.</p> <p>Set up practical enquiries and fair tests to check the melting rate. WS 2</p> <p>Make careful observations about the experiment and gather data WS 3 and 4 Focus on the children’s ability to use and read a stopwatch and thermometer</p> <p>Record findings from the experiment WS 5</p> <p>Use results to draw conclusions – What did the test show us? WS 7</p> <p><u>Research</u> Research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. WS 6</p>
<p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</p>	<p>-To know that water flows around our world in a continuous process called the water cycle.</p> <ul style="list-style-type: none"> -To know that water on the earth’s surface (at the surface of the seas, rivers etc) evaporates into water vapour (gas). -To explain how water vapour then rises, cools and condenses back into a liquid to form clouds. -To know that when too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow or sleet which is known as precipitation. 	<p><u>Researching</u> Research the water cycle. WS 6</p>

Vocabulary	<p>Solid, liquid, gas</p> <p>State change, Melting, Freezing, Melting point, Boiling point, Evaporation Temperature</p> <p>Water cycle, Evaporation, Condensation, Water vapour, Precipitation</p>
Common Misconceptions	<p>Some children may think:</p> <ul style="list-style-type: none"> -‘solid’ is another word for hard or opaque -Solids are hard and cannot break or change shape easily and are often in one piece -Substances made of very small particles like sugar or sand cannot be solids -When air is pumped into balloons, they become lighter -Water in different forms – steam, water, ice – are all different substances. -All liquids boil at the same temperature as water (100 degrees) -Melting, as a change of state, is the same as dissolving -Steam is visible water vapour (only the condensing water droplets can be seen)
Key Questions	<ul style="list-style-type: none"> - What are the three states of matter? - Can you give an example of a solid, liquid and gas? - How can a material change state from a solid to a liquid/liquid to gas? - What is evaporation? - What is condensation?

<p>Y4</p>	<p><u>Living Things and their Habitats</u></p> <p>This unit is where pupils learn about plants and animals as part of the discipline of biology- the study of living organisms. Pupils have a secure knowledge of the functions of the different parts of flowering plants and the requirements of plants for life and growth. They know how water is transported within plants and the part that flowers play in the life cycle of flowering plants. This Year 4 unit builds upon pupils' prior knowledge of plants as they identify and name a variety of living things in their local and wider environment. Pupils group living things and begin to use classification keys for flowers (flowering and nonflowering). Animals are classified into warm blooded and cold-blooded, vertebrates and invertebrates. Pupils learn that environments can change and that this can sometimes pose dangers to living things. The knowledge of plants acquired in this unit will help pupils at the end of Year 4 to construct and interpret a variety of food chains, identifying producers, predators and prey. This is the precursor to work studied in Year 5 as pupils identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. They will also describe the life process of reproduction in some plants and animals. This links to work studied in Year 6 when pupils study Linnaean classification, adaptations and sexual reproduction in plants.</p>	
<p>National Curriculum (End of Unit Outcomes)</p>	<p>Sequence of Learning (small steps)</p>	<p>Key skills – Working Scientifically</p>
<p>Recognise that living things can be grouped in a variety of ways</p>	<ul style="list-style-type: none"> -To group a wide selection of living things that include animals, flowering plants and non-flowing plants. -To group living things based on their physical characteristics or features, e.g. fur, scales, gills etc. -To begin to identify how these can be grouped into fish, amphibians, reptiles, birds and mammals (vertebrates) or snails, slugs, worms, spiders, insects (invertebrates). -To group living things based on their behaviour e.g. herbivore or carnivore. 	<p><u>Observing over time</u> Making systematic and careful observations of living things in local environments WS 3</p> <p>Classifying living things in our environment based on our own criteria WS 4</p> <p>Reporting on findings – presentations WS6</p>
<p>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</p>	<ul style="list-style-type: none"> -To know that a classification key uses questions to sort and identify different living things -To know how to use a classification key to identify living things -To know how to use a classification key to sort plants and animals in the local environment. 	<p><u>Identifying and classifying</u> Use keys to explore and identify local plants and animals. WS 4</p>
<p>Recognise that environments can change and that this can sometimes pose dangers to living things.</p>	<ul style="list-style-type: none"> -To identify that living things live in habitats suited to their environment (recap from year 2). -To know that these environments may change naturally due to flooding, fire, earthquakes etc. -To know that changes to the environment can make it more difficult for living things to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies 	<p><u>Researching</u> Researching how environmental issues impact on living things WS 6</p>

	<p>-To know that humans can cause changes to the environment in positive (nature reserves) or negative ways (litter, pollution).</p> <p>-To understand how climate change caused by pollution can change the environment endangering the existence of many living things. Focus on the polar bear as an example where climate change is endangering their existence.</p> <p>-To know that many species of living things have already been made extinct as a result of human activity</p> <p>-To understand that environments can also change with seasons and that living things may live in different places dependent on the time of year.</p>	
Vocabulay	<p>Characteristics, Living things, Herbivore, Carnivore, Omnivore</p> <p>Classification, classification keys</p> <p>Environment, Habitat, Human impact, Climate change, Positive, Negative, Migrate, Hibernate</p>	
Common Misconceptions	<p>Some children may think:</p> <ul style="list-style-type: none"> • the death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain • there is always plenty of food for wild animals • animals are only land-living creatures • animals and plants can adapt to their habitats, however they change • all changes to habitats are negative. 	
Key Questions	<ul style="list-style-type: none"> - What is a vertebrate/invertebrate? - Is a _____ a mammal? How do you know? - How could you group these animals/plants? - What is a habitat? - What type of questions are used in classification keys? - What negative impacts could humans have on the environment? 	

<p>Y4</p>	<p><u>Sound</u></p> <p>This is a stand-alone unit where pupils learn about sound as part of the discipline of physics - the study of the processes that shape our world and how we use it. It is important to assume that all pupils have very little prior knowledge in this unit. During teaching, extra attention must be given to explicitly teaching the precise meaning of subject specific vocabulary as pupils may be unfamiliar with this. This unit does not link directly with any future science teaching, but may have links with music to aid consolidation, so it is important that knowledge is secured during the unit. In Year 4, pupils identify how sounds are made and recognise that vibrations from sounds travel through a medium to the ear. Learning includes the anatomy of the ear and how whales communicate via Whale Song. The knowledge of sound acquired in this unit will help pupils find patterns between the pitch of a sound and features of the object that produced it. It also helps pupils find patterns between the volume of a sound and the strength of the vibrations that produced it. Pupils will know that sounds get fainter as the distance from the sound source increases.</p>	
<p>National Curriculum (End of Unit Outcomes)</p>	<p>Sequence of Learning (small steps)</p>	<p>Key skills – Working Scientifically</p>
<p>Identify how sounds are made, associating some of them with something vibrating</p>	<p>-To know sounds are made when something vibrates.</p> <p>-To know that vibrate means to shake with repeated small quick movements.</p> <p>-To look at examples showing this such as metal that vibrates when it is struck and vocal chords inside our throat which vibrate when we speak.</p> <p>-To know that this causes the air around the source of the sound to vibrate. The vibration travels through the air to our ear in a wave.</p> <p>-To explore making sounds using different instruments and feeling the vibrations. This could also be done with tuning forks in rice or water and with elastic bands so that children can see the vibrations</p>	<p>Observation Looking at the effect of vibrations on tuning forks and water – exploring what happens and how we can see the vibrations move the water. WS 3</p>
<p>Recognise that vibrations from sounds travel through a medium to the ear</p>	<p>To be aware of the basic structure/ anatomy of the human ear.</p> <p>-To know that the ear consists of the outer ear and inner ear.</p> <p>-To know that the eardrum is a thin piece of stretched skin inside the ear which vibrates. <i>(these vibrations then travel through a sequence of small bones - the smallest bones in the human body. These bones connect to the cochlea. Small hairs in the cochlea convert the vibrations into nerve impulses which send information to the brain for processing.)</i></p> <p>-To know the vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.</p> <p>-To know that ears need looking after and that loud noises can damage the ear and our ability to hear.</p> <p>-To know that sound waves can travel through solids (such as metal, stone and wood), liquids (such as water) and gases (such as air).</p> <p>-To know that where there is no gas, there is no sound. Sound cannot travel through space as there is no air. This is called a vacuum.</p>	

	<p>-To know that sound travels faster through water than air. Look at whale song as an example linked to this.</p> <p>-To know that pitch is how high or low a sound is.</p> <p>-To explore how the pitch can be changed – such as the length of a guitar string, amount of water in bottles, size of tuning forks.</p>	
Find patterns between the volume of a sound and the strength of the vibrations that produced it	<p>-To know that pitch and volume are different - volume is how loud or quiet a sound is.</p> <p>-To know that the loudness (volume) of the sound depends on the strength (size) of the vibrations.</p> <p>-To know that sounds are measured in decibels</p> <p>-To use drums to explore the difference in volume – with more pressure/force, a greater vibration is created and then a louder sound.</p>	<p>Pattern Seeking Ask questions about how the pitch of a sound can be changed e.g. Does a thicker band create a higher pitch? WS 1</p>
Recognise that sounds get fainter as the distance from the sound source increases	<p>To know that these vibrations decrease as they travel through a medium.</p> <p>-To know that as sound travels the vibrations become weaker because they run out of energy.</p> <p>-To know that the further away from the sound source, the quieter the sound will be.</p> <p>-To know that an insulator is a material that blocks sound effectively.</p>	<p>Pattern seeking Look at how distance from a sound affects the volume in decibels (See White Rose Volume experiment) - bar charts could be made from this. WS 4 and 5</p> <p>Report on findings from the test carried out. WS 6</p> <p>Draw conclusions WS 7</p> <p>Use evidence to answer questions. WS 9</p> <p>Decibel meter on iPads?</p>
Vocabulary	<p>Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation</p>	
Common Misconceptions	<p>Pitch and volume are frequently confused, as both can be described as high or low.</p> <p>Some children may think:</p> <ul style="list-style-type: none"> • sound is only heard by the listener • sound only travels in one direction from the source • sound can't travel through solids and liquids • high sounds are loud and low sounds are quiet. 	

Key Questions	<ul style="list-style-type: none"> - How are sounds made? - What is a vibration? - How do we hear sound? - What is the outer ear? - What is the inner ear? - How is sound measured? - How would distance from the sound source affect how you hear it?
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Y4	<p><u>Electricity</u></p> <p>This unit is the first of two science units where pupils learn about electricity as part of the discipline of physics - the study of the processes that shape our world and how we use it. Children will have limited prior knowledge before studying this unit.</p> <p>During this unit, pupils identify common appliances that run on electricity and construct a simple series electrical circuit, identifying and naming its basic parts. Pupils investigate 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. Pupils recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. They recognise some common conductors and insulators, and associate metals with being good conductors.</p> <p>The knowledge acquired in this unit will help pupils to compare and group together everyday materials on the basis of their properties, in terms of conductivity, in Year 5. This is the precursor to work studied in Year 6 when pupils use recognised symbols when representing a simple circuit in a diagram. Pupils investigate the brightness of lamps or the volume of buzzers with the number and voltage of cells used in the circuit. Pupils compare and give reasons for variations in how components function.</p>	
National Curriculum (End of Unit Outcomes)	Sequence of Learning (small steps)	Key skills – Working Scientifically
Identify common appliances that run on electricity	<p style="background-color: yellow;">-To know and identify different household appliances that run on electricity.</p> <ul style="list-style-type: none"> -To understand that some plug into the mains and others run on batteries. -To know that electricity is dangerous, and know how to be safe using it. -To identify the hazards that might be faced in the home (e.g. overloaded extensions, exposed wires, damaged sockets, wires and electricals near water, placing metal into appliances that use electricity etc). -To know how to prevent these hazards and know not to touch anything they feel is unsafe. 	<p>Classifying Household appliances as electrical/ not electrical or batteries/ mains WS 8</p>

<p>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p>	<p>-To construct simple circuits with different components such as bulbs, buzzers and motors.</p> <p>-To understand that an electrical circuit consists of a cell or battery connected to a component using wires.</p> <p>-To draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6. WS 9</p> <p>-To know that Thomas Edison invented the incandescent electric light bulb in 1879 in New Jersey, USA. (Video Clip - https://www.youtube.com/watch?v=0wkjISZt0ko)</p>	<p>Comparative/fair testing Asking relevant questions – will this circuit work? WS 1 Using results to draw simple conclusions and make predictions – would this bulb light in this circuit? Using scientific evidence to support findings</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>- To know how electricity travels through a circuit</p> <p>-To know that electricity must be able to flow around the circuit for components to work</p> <p>-To understand that if there is a break in the circuit, a loose connection or a short circuit, the component will not work.</p> <p>-To know if the following circuits work or not. 1. A complete circuit without switches. 2. A circuit with wires not connected to the cell on one side. 3. A complete circuit with an open switch. 4. A complete circuit with a closed switch. 5. A circuit where the wire is not connected to the bulb / buzzer / motor.</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>-To understand how to add a switch to the circuit to turn the component on and off.</p> <p>-To know that an open switch will not complete the circuit and that a closed switch will complete the circuit.</p>	
<p>Recognise some common conductors and insulators, and associate metals with being good conductors</p>	<p>-To know that conductors allow electricity to pass through them.</p> <p>-To know that insulators prevent the passage of electricity</p> <p>-To identify different materials as conductors and insulators. (e.g. metals such as copper, iron and steel make good conductors, but plastic, wood and paper are insulators.)</p> <p>-To understand that metals are good conductors so they can be used as wires in a circuit.</p> <p>-To understand that Non-metallic solids are insulators except for graphite (pencil lead).</p> <p>-To understand that water, if not completely pure, also conducts electricity.</p>	<p>Comparative/fair testing Plan an investigation to check the conductive properties of materials, with pupils predicting that metals will allow a circuit to be complete, but that other materials will not. WS 2 and 4</p> <p>Test the predictions and record in a table WS 3</p>

Vocabulary	<p>Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol</p>
Common Misconceptions	<p>Some children may think:</p> <ul style="list-style-type: none"> • electricity flows to bulbs, not through them • electricity flows out of both ends of a battery • electricity works by simply coming out of one end of a battery into the component.
Key Questions	<ul style="list-style-type: none"> - Where do you use electricity? - What are some of the dangers or hazards associated with electricity? - What is a circuit? - How could a switch affect a circuit? - What is an electrical conductor/insulator?