



# The Science Curriculum

## Year 4

Intent	<p>At Benjamin Adlard Primary School we believe that a high quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.</p> <p>Science in our school is about developing children's ideas and ways of working that enable them to make sense of the world in which they live through investigation, as well as using and applying process skills. The staff at Benjamin Adlard Primary School ensure that all children are exposed to high quality teaching and learning experiences, which allow children to explore their outdoor environment and locality, thus developing their scientific enquiry and investigative skills. They are immersed in scientific vocabulary, which aids children's knowledge and understanding not only of the topic they are studying, but of the world around them. We intend to provide all children regardless of ethnic origin, gender, class, aptitude or disability, with a broad and balanced science curriculum.</p>
Implementation	<p>The planning and teaching of the science curriculum is designed to build on knowledge and skills taught in previous units and year groups. Teachers use the school's science progression framework to plan and teach key concepts and scientific enquiry skills in a progressive manner and support the acquisition and accumulation of knowledge. New vocabulary is planned and is taught explicitly to children, teaching the meaning of homonyms where necessary. Retrieval practice techniques are used to help children to memorise key concepts for use in future science lessons and across the curriculum. When teaching practical science, teachers combine demonstrations with opportunities for children to carry out their own investigations, gaining hands-on experience handling specialist equipment and materials.</p>
Impact	<p>Our science curriculum provides the foundations for our children for understanding the world they live in. Through building up a body of knowledge and key concepts, our children develop a sense of excitement and curiosity and they understand how science can be used to explain what has occurred, predict how things will behave and analyse the causes. Our children understand the value of science and enjoy working scientifically. They are able to communicate their ideas and findings with confidence and using different styles. Our children have a passion for science and engage enthusiastically in their learning. As a result, they achieve well and are keen to continue studying science as they move on to the next stage of their education.</p>

	EYFS	End of Key Stage One	Lower Key Stage Two	Upper Key Stage 2
Working scientifically	<ul style="list-style-type: none"> <li>Observe things closely through a variety of means (photos, magnifiers)</li> <li>With support, notice and discuss patterns around them.</li> </ul>	<ul style="list-style-type: none"> <li>Explore the world around them and raise their own simple questions.</li> <li>Begin to recognise that there are different ways to answer a scientific question.</li> <li>Experience a variety of practical scientific enquiries.</li> <li>Carry out a simple test.</li> <li>Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (Identify and classify).</li> <li>Observe closely using simple equipment: pooters, magnifying glasses</li> <li>With guidance, begin to notice patterns and relationships.</li> <li>Use simple measurements and equipment to gather data (egg timers, lenses, magnifiers)</li> <li>Use observations and ideas to suggest answers to questions.</li> </ul>	<ul style="list-style-type: none"> <li><b>Raise their own relevant questions about the world around them.</b></li> <li><b>Provide a range of different scientific experiences including different types of scientific enquiries to answer questions.</b></li> <li><b>Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions.</b></li> <li><b>Set up simple scientific enquiries, comparatives and fair tests.</b></li> <li><b>Recognise when a fair test is necessary and help to decide how to set it up.</b></li> <li><b>Talk about the criteria for sorting, grouping and classifying; and use simple keys.</b></li> <li><b>Make systematic and careful observations.</b></li> <li><b>Help to make decisions about the observations to make, how long to make them for and the type of simple equipment that might be used.</b></li> <li><b>Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them.</b></li> <li><b>Take accurate measurements using standard units.</b></li> <li><b>Learn how to use a greater range of equipment including data loggers and thermometers.</b></li> </ul>	<ul style="list-style-type: none"> <li>Use their own science experiences to explore ideas and raise different kinds of questions.</li> <li>Talk about how scientific ideas have developed over time.</li> <li>Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions.</li> <li>Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.</li> <li>Use and development keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment.</li> <li>Make decisions about what observations to make, what measurements to use and long to make them for.</li> <li>Look for different causal relationships in data and identify evidence that refutes or supports their ideas.</li> <li>Choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. Take repeat measurements where appropriate.</li> </ul>
Communicating Scientifically	<ul style="list-style-type: none"> <li>With support, talk about patterns and changes that have been seen.</li> </ul>	<ul style="list-style-type: none"> <li>Record simple data.</li> <li>Talk about what you have found out and how you have found out.</li> <li>With support, record and communicate findings in a range of ways, beginning to use simple scientific language.</li> </ul>	<ul style="list-style-type: none"> <li><b>Collect and record data from observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams and keys.</b></li> <li><b>Look for changes, patterns, similarities and differences in data in order to draw simple conclusions and answer questions.</b></li> </ul>	<ul style="list-style-type: none"> <li>Decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</li> <li>Identify scientific evidence that has been used to refute or support ideas or arguments.</li> <li>Use relevant scientific language and illustrations to discuss, communicate and justify scientific ideas, use oral and written forms such as displays and other presentations to report conclusions, causal relationships and explanations of degrees of trust in results.</li> <li>Use results to make predictions and identify when further observations, comparative and fair tests might be needed.</li> </ul>
Animals, including humans	<ul style="list-style-type: none"> <li>Identify and name some common animals. This will be linked to personal experiences such as pets, books or days out with family.</li> </ul>	<ul style="list-style-type: none"> <li>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.</li> <li>Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</li> <li>Understand that animals, including humans, have offspring which grow into adults.</li> <li>Describe the basic needs of animals, including humans, for survival: water, food, air</li> <li>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</li> </ul>	<ul style="list-style-type: none"> <li>Know that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food and that they get their nutrition from the food they eat.</li> <li>Know that humans and some other animals have skeletons and muscles for support and movement.</li> <li><b>Know the basic functions of the human digestive system.</b></li> <li><b>Know the types of teeth in the human mouth and their function.</b></li> <li><b>Know how to construct and interpret a food chain, identifying predators, prey and producers.</b></li> </ul>	<ul style="list-style-type: none"> <li>Know how humans develop and change to old age.</li> <li>Know how to group plants, animals and microorganisms based on common, observable characteristics.</li> <li>Give reasons for the classification chosen.</li> <li>Know the main parts of the human circulatory system.</li> <li>Know the functions of the heart, blood vessels and blood.</li> <li>Know what impact diet, exercise, drugs and lifestyle has on the function of the human body.</li> <li>Know how water is transported within animals.</li> </ul>

Living Things and their Habitats	<ul style="list-style-type: none"> <li>Make observations of living things in the immediate environment.</li> </ul>	<ul style="list-style-type: none"> <li>Explore and compare the differences between things that are living, dead, and things that have never been alive.</li> <li>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.</li> <li>Identify and name a variety of plants and animals in their habitats, including micro-habitats.</li> <li>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.</li> </ul>	<ul style="list-style-type: none"> <li><b>Know that living things can be classified in different ways.</b></li> <li><b>Know how to use a classification key to group, identify and name a variety of living things.</b></li> <li><b>Know that environments can change and that these changes can pose danger to living things.</b></li> </ul>	<ul style="list-style-type: none"> <li>Know how lifecycles differ for mammals, insects and birds.</li> <li>Know the process of reproduction for plants and animals.</li> </ul>
Plants	<ul style="list-style-type: none"> <li>With support, make observations of plants in the immediate environment</li> </ul>	<ul style="list-style-type: none"> <li>Identify and name a variety of common wild and garden plants.</li> <li>Identify and name a variety of native evergreen and deciduous trees.</li> <li>Know the basic structure of a variety of common flowering plants including: petal, leaf, trunk, branch, stem, root, fruit, bulb, seed</li> <li>Observe and describe how bulbs and seeds grow into mature plants.</li> <li>Know that plants need water, light and a suitable temperature to grow and stay healthy.</li> </ul>	<ul style="list-style-type: none"> <li>Know the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.</li> <li>Know the requirements of a plant for life and growth (air, water, nutrients from soil, and room to grow) and how they vary from plant to plant.</li> <li>Investigate the way in which water is transported in plants.</li> <li>Know the life cycle of a flowering plants: pollination, seed formation and seed dispersal.</li> </ul>	
Materials, their properties and change	<ul style="list-style-type: none"> <li>Use a variety of materials during independent play: plastic jugs, wooden blocks, fabric puppets.</li> </ul>	<ul style="list-style-type: none"> <li>Distinguish between an object and the material from which it is made.</li> <li>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.</li> <li>Describe the simple physical properties of a variety of everyday objects.</li> <li>Compare and group together a variety of everyday materials on the basis of their simple physical properties.</li> <li>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</li> </ul>		<ul style="list-style-type: none"> <li>Know how to group materials based on their hardness, solubility, transparency, conductivity and response to magnets.</li> <li>Know that some materials will dissolve in liquid to form a solution and how to recover a substance from a solution.</li> <li>Know how to best separate a mixture using filtering, sieving and evaporating.</li> <li>Know that dissolving, mixing and changes of state are reversible.</li> <li>Know that some changes result in the formation of a new material and that this is usually irreversible.</li> </ul>
Seasonal Changes	<ul style="list-style-type: none"> <li>Observe and name the types of weather seen on a daily basis.</li> </ul>	<ul style="list-style-type: none"> <li>Observe changes across the four seasons.</li> <li>Observe and describe weather associated with these seasons and how day length varies.</li> </ul>		
Rocks			<ul style="list-style-type: none"> <li>Compare and group different kinds of rocks on the basis of their appearance and simple physical properties.</li> <li>Describe in simple terms how fossils are formed.</li> <li>Know that soils are made from rocks and organic matter.</li> </ul>	

Light	<ul style="list-style-type: none"> <li>Explore sources of light: torches, ceiling lights, the sun, the moon.</li> </ul>		<ul style="list-style-type: none"> <li>Know that light is needed in order to see.</li> <li>Know that dark is the absence of light.</li> <li>Know that light can be reflected from surfaces.</li> <li>Know that light from the sun can be dangerous and know some ways to protect yourself.</li> <li>Know how shadows are formed and that their size can be changed.</li> </ul>	
Forces and Magnets	<ul style="list-style-type: none"> <li>Explore and investigate bar magnets. Can you find an object that will stick to a magnet?</li> </ul>		<ul style="list-style-type: none"> <li>Know that objects will move in different ways on different surfaces.</li> <li>Know that some forces can act at a distance and that some forces need direct contact between two objects.</li> <li>Know that magnets have two poles and how magnets behave depending on which of the poles meet.</li> <li>Know that some objects are attracted to metals but some are not.</li> </ul>	<ul style="list-style-type: none"> <li>Know that an unsupported object will fall to the Earth because of the effect of gravity.</li> <li>Know how water resistance, air resistance and friction act between moving surfaces.</li> <li>Know how levers, pulleys and gears allow a smaller force to have a greater effect.</li> </ul>
States of Matter	<ul style="list-style-type: none"> <li>Explore malleable materials with hands, fingers and a variety of tools.</li> </ul>	<ul style="list-style-type: none"> <li>Know that some objects can be squashed, bent, twisted or stretched depending on the material they are made from.</li> </ul>	<ul style="list-style-type: none"> <li><b>Know if a material is a solid, liquid or gas.</b></li> <li><b>Know that heating or cooling a material can change its state.</b></li> <li><b>Know that some changes can be reversed and that some are irreversible.</b></li> <li><b>Know that evaporation rate increases as temperature increases.</b></li> </ul>	
Sound			<ul style="list-style-type: none"> <li>Know that some sounds are created when an object vibrates.</li> <li>Know that vibrations from sounds travel through a medium (usually the air) to the ear.</li> <li>Know that features of an object will change the pitch of a sound.</li> <li>Know that as the strength of vibrations increases, the volume of a sound will increase.</li> <li>Know that sounds get fainter as the difference from the sound source increases.</li> </ul>	
Electricity			<ul style="list-style-type: none"> <li>Know that common appliances require electricity to run.</li> <li>Know how to construct a simple series circuit.</li> <li>Know the basic parts of an electrical circuit.</li> <li>Know that a circuit must complete a full loop in order for the electricity to flow around it.</li> <li>Know how a switch affects a series circuit.</li> <li>Know that some materials conduct electricity and some insulate electricity.</li> </ul>	
Earth and Space				<ul style="list-style-type: none"> <li>Know how the Earth and the other planets move in relation to the sun.</li> <li>Know how the moon moves in relation to the earth.</li> <li>Know that the sun, moon and earth are approximately spherical bodies.</li> <li>Know that the rotation of the Earth explains the concept of day and night.</li> </ul>

Evolution and Inheritance				<ul style="list-style-type: none"><li>• Know that living things have changed over time.</li><li>• Know that fossils provide information about livingthings that inhabited the earth millions of years ago.</li><li>• Know that living things produce offspring of the samekind, but that normally offspring vary and are not identical to their parents.</li><li>• Know that animals have adapted to suit theirenvironment in different ways and that this adaption may lead to evolution.</li></ul>
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Year 4 – Autumn 1	Sound
Prior Learning	Next Steps
Sound isn't taught explicitly in science prior to Year 4 but it is a key part of the music curriculum in Key Stage One and into Key Stage Two.	<p>Key Stage Three</p> <p>Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound</p> <p>Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal</p> <p>The auditory range of humans and animals</p>

#### National Curriculum objectives:

- Identify how sounds are made, associating some of them with something vibrating
- Recognise that vibrations from sounds travel through a medium to the ear
- Find patterns between the pitch of a sound and features of the object that produced it
- Find patterns between the volume of a sound and the strength of the vibrations that produced it
- Recognise that sounds get fainter as the distance from the sound source increases

Knowledge Objectives	Scientific Skills
To know how sounds are made and associate them with vibration. To know that vibrations from sounds travel through a medium to the ear.	Ask relevant questions and use different types of scientific enquiries to answer them. Use straightforward scientific evidence to answer questions or to support their findings.

#### Key Assessment Questions

How is a sound created?  
How does the sound travel from the pinna to the brain?  
Can you label a diagram of the ear?

#### Key Vocabulary

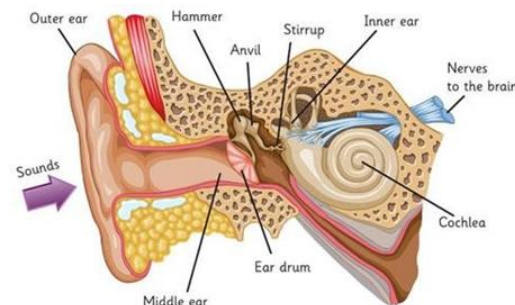
Sound, listen, hear, ears, noise, loud, quiet, silent, vibrations

#### Knowledge to be taught (Gateway Knowledge in red)

Sound is created when something vibrates and sends waves of energy (vibration) into our ears.  
The vibrations travel through the air or another medium (solid, liquid or gas) to the ear.  
The stronger the vibrations, the louder the sound. Sounds are fainter the further you get from the sound source.

#### Know the function of these parts:

- Pinna – Funnels the sound into the middle ear.
- Ear Canal – Transmits sound from the pinna to the ear canal.
- Ear Drum - Senses vibrating sound waves and converts the vibration into nerve impulses that convey the sound to your brain. It also protects the middle ear from bacteria as well as water and foreign objects.
- Malleus (Hammer), Incus (Anvil) and Stapes (Stirrup) – The bones of the inner ear – Convert vibrations on the ear drum into vibrations in the fluid of the cochlea.
- Cochlea – Convert the vibrations in the cochlear fluid into neural signals (signals sent to the brain).



Definitions	
vibrate	Move continuously to and fro.
source	A thing or place from which something originates.
medium	A substance through which something can travel.

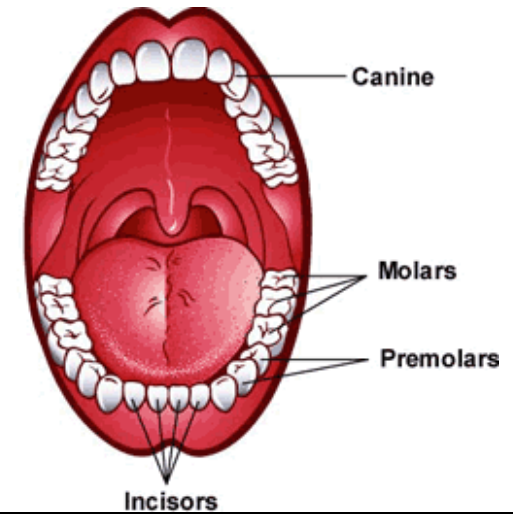
Scientific Enquiry					
Goona 'soundwalk' through the school and begin to think about how sound is made.			Explore sound further and investigate vibrations and how sound travels.		
Investigate pitch and volume by exploring instruments and the different sounds they make.					
Medium Term Planning					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
To identify how sounds are made.	To recognise that vibrations from sounds travel through a medium to the ear.	To find patterns between the pitch of a sound and features of the object that produced it.	To find patterns between the volume of a sound and the strength of the vibrations that produced it.	To recognise that sounds get fainter as the distance from the sound source increases.	Assessment opportunity



Year 4 – Autumn 2		The Human Digestive System
Prior Learning		Next Steps
Year 1 – Name and identify carnivores, herbivores and omnivores Year 2 – Simple Food Chains - Know that living things depend on other living things in order to survive.		<u>Key Stage Three</u> The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)
<b>National Curriculum objectives:</b> <ul style="list-style-type: none"> <li>Describe the simple functions of the basic parts of the digestive system in humans</li> <li>Identify the different types of teeth in humans and their simple functions</li> <li>Construct and interpret a variety of food chains, identifying producers, predators and prey.</li> <li>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.</li> </ul> <b>Cross-Curricular Links</b> PSHE – Oral health, the importance of a good diet to maintain digestive health		
Knowledge Objectives		Scientific Skills
To know the different types of teeth in humans and their simple functions. To know the simple functions of the organs of the digestive system.		Ask relevant questions and use different types of scientific enquiries to answer them. Use straightforward scientific evidence to answer questions or to support their findings. Set up simple practical enquiries, comparative and fair tests.
Key Assessment Questions		
Can you describe the function of a molar, incisor, canine? Can you describe the journey of a mouthful of food through the digestive system? Can you draw and label a simple food chain?		
Key Vocabulary		
teeth, incisors, molars, canines, jaw, evidence, digestion, chew, saliva, digestive system, nutrition, mouth, teeth, oesophagus (gullet), stomach, small intestine, large intestine, rectum, anus, faeces (poo), herbivore, carnivore, omnivore, digestion, diet, food chain, producer, predator, prey, consumer, herbivore, omnivore, carnivore, impact		
Knowledge to be taught (Gateway knowledge in red)		

Adults have 32 teeth. You should have this full set of adult teeth by your late teens:

- 8 incisors - Your four front teeth on the top and bottom are sharp for holding and cutting food. Incisors also help you sense the texture and kind of food you eat.
- 4 canines - The pointed teeth on the top and bottom are called canine teeth. They have cusps for grabbing and tearing food.
- 8 premolars - These teeth are between the cuspids and molars both physically and in form. Premolars look like molars but they have two cusps and are sometimes called bicuspid. Premolars cut and tear food.
- 12 molars - You have eight molars on top and bottom. They have broad chewing surfaces to grind down food before it's finally swallowed. This includes wisdom teeth, your third set of molars, which can show up as late as your early 20s and are often removed.



### The Parts and Functions of the Digestive System

- Mouth - Entry point for food, where saliva mixes with food, location of tongue and teeth, top part of the mouth (soft palate) helps move food along to the oesophagus.
- Oesophagus - A muscular tube which forms the path from the mouth to the stomach. Muscles contract and relax to move food down the oesophagus to the stomach.
- Stomach - Glands line the stomach produce acid and enzymes which breaks the food down further. Muscles in the stomach mix the food.
- Liver - Produces bile which helps to absorb fats. Bile is sent to the gallbladder to be stored.
- Gallbladder - Releases bile into the duodenum when needed.
- Pancreas - Produces enzymes to break down fats, proteins and carbohydrates. Releases them into the duodenum.
- Duodenum - First part of the small intestine. Food is broken down by bile from the gallbladder and enzymes from the pancreas.
- Small Intestine - The other parts of the small intestine – (jejunum and ileum) absorb nutrients from the food. Pass any leftover broken down food to the large intestine.
- Large Intestine - Connects the small intestine to the rectum. Absorbs water from waste food. Forms stool from waste food.
- Rectum - Stores stool passed to it from the large intestine. Makes brain aware of need to go to the toilet.
- Anus - Releases the stool and ends the digestive process.

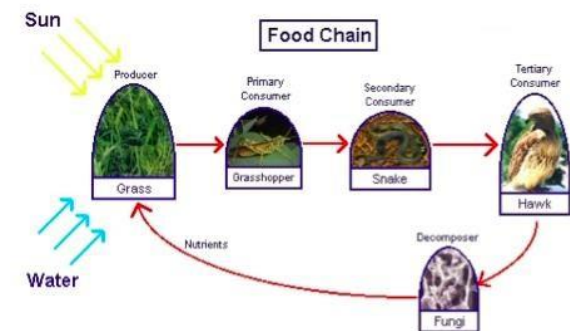
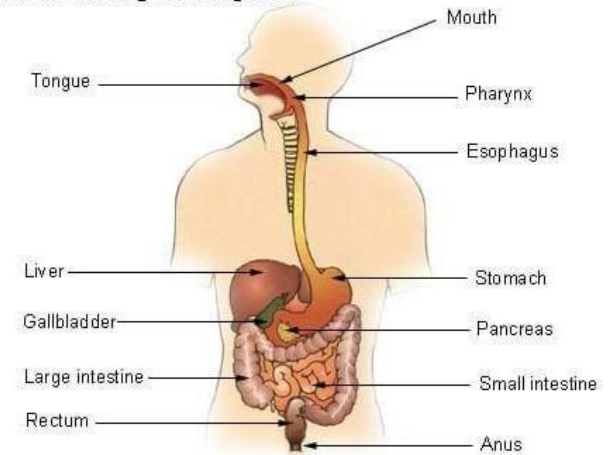
### Food Chains

- Recap the definition of a:
  - Carnivore – Eats meat and fish
  - Herbivore – Eat plants and plants products – nuts, berries, seeds
  - Omnivore – Eat a combination of meat, fish, plants and plant products

Humans are generally omnivores but can choose to be vegetarian or vegan.

- A predator is an animal that kills and eats another animal. The other animal is it's prey (revisit from Year 3).
- Producers are usually green plants which produce nutrients (food) by photosynthesis (conversion of sunlight and water to energy).
- Herbivores eat the plants (producers) and then they are eaten by carnivores or omnivores, so the food (energy) is passed along the 'chain'.
- Omnivores eat both plants and animals. Animals can also be classified as consumers, either primary consumers (herbivores) that eat the producers, i.e. plants, and secondary consumers (carnivores) that eat animals.

### **Organs of the Digestive System**



Definitions					
Vegetarian	An animal that does not eat meat.				
Vegan	An animal that does not eat any product that comes from an animal including meat, milk, eggs etc.				
Predator	An animal that kills and eats another animal.				
Prey	An animal that is killed and eaten by a predator.				
Bile	A greenish/brown fluid that is produced by the gallbladder and helps to digest food.				
Enzyme	A substance that helps to digest food.				
Scientific Enquiry					
Learn about the first stage of the digestive system, consider why our teeth are different shapes and have different functions.	Use everyday objects to demonstrate the human digestive system.				
Find out what we can learn from faeces.	Interpret food chains and discuss the impact of changes to a chain.				
Plan and perform a ‘Healthy Teeth’ assembly for an invited audience.					
Medium Term Planning					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
To name and know the function of the different types of human teeth.	To know the basic components of the human digestive system.	To know what the small intestine does.	To know how faeces is produced and how diet might affect it.	To know how to construct and interpret a variety of food chains.	Assessment Opportunity

Year 4 – Spring 1	Science – Electricity	
Prior Learning		Next Steps
Electricity is not explicitly taught prior to Year 4		Year 6 – Understand how the number of cells/batteries will affect the brightness and volume of a bulb or buzzer. Know what current and voltage is.
<b>National Curriculum objectives:</b> <ul style="list-style-type: none"> <li>Identify common appliances that run on electricity</li> <li>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</li> <li>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</li> <li>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</li> <li>Recognise some common conductors and insulators, and associate metals with being good conductors.</li> </ul>		
<u>Cross-Curricular Links</u> PSHE – The safe use of electricity in the home.		
Knowledge Objectives		Scientific Skills
<ul style="list-style-type: none"> <li>To know some common appliances that run on electricity.</li> <li>To know how to construct a simple series electrical circuit.</li> <li>To identify and name the basic parts of a simple series circuit: cells, wires, bulbs, switches and buzzers.</li> <li>To know how to draw a circuit diagram.</li> <li>To know that some materials are conductors of electricity and others are insulators.</li> <li>To 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</li> </ul>		<ul style="list-style-type: none"> <li>Ask relevant questions and use different types of scientific enquiries to answer them.</li> <li>Set up simple practical enquiries, comparative and fair tests.</li> <li>Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</li> <li>To report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.</li> <li>To use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</li> <li>Use straightforward scientific evidence to answer questions or to support their findings</li> </ul>
Key Assessment Questions		
Can you name some of the dangers associated with electricity? Can you draw and name the symbols used in a simple circuit diagram? Can you draw a simple circuit that would light a bulb? Can you name some electrical conductors/insulators?		
Key Vocabulary		
Electricity, circuit, switch, battery, plug, mains, appliance, device, wire, crocodile clip, bulb, buzzer, connection, power, cell, danger, power, electrocute, energy, flow, current		
Knowledge to be taught (Gateway knowledge in red)		

Key Safety Teaching Point: Experimenting with battery powered circuits presents no danger. However, mains electricity is very dangerous and must not be played with.

There are many appliances in the home that rely on electricity and the source of this can be the main electricity supply or batteries.

Electrocution can happen if an electrical current comes into contact with the human body. This usually happens when people use good conductors of electricity too close to the mains supply. This happens is wires are exposed, fingers pushed into electrical sockets, wet hands near sockets

Other dangers associated with electricity include:



- Overloading sockets
- Trailing wires

### Simple Electrical Circuits

The difference between a cell and a battery is that a cell is a single unit that converts chemical energy into electrical energy, and a battery is a collection of cells (there is a simple explanation of the difference on BBC Bitesize

[http://www.bbc.co.uk/bitesize/ks3/science/energy\\_electricity\\_forces/electric\\_current\\_voltage/revision/3/](http://www.bbc.co.uk/bitesize/ks3/science/energy_electricity_forces/electric_current_voltage/revision/3/)

In order to light the bulb, the cell, wires and bulb must be within one continuous circuit.

The cell converts the chemical energy stored within it, into electrical energy, which, in turn, makes the bulb light up.

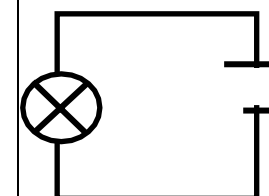
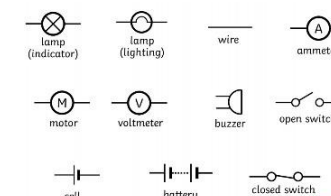
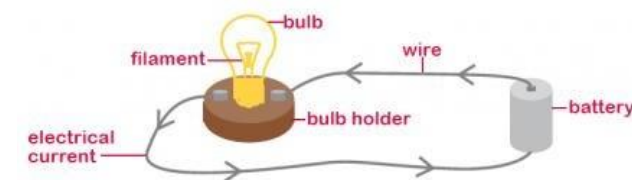
If the circuit is broken, the bulb will no longer be lit. The same applies when using buzzers or motors.

The components of a circuit can be represented using symbols to create a circuit diagram (see right).

### Conductors and Insulators

Electrical insulators are materials that prevent electrical energy passing through them.

Electrical conductors are materials that allow electrical energy to pass through them.



## Definitions

Electrocute	To injure or kill by electric shock.
Conductor	A material that transmits electricity.
Insulator	A material that does not transmit electricity.
Appliance	A piece of equipment that runs on electricity.

## Scientific Enquiry

Using the equipment provided (bulbs, wires, cells, crocodile clips) attempt to light a bulb using a simple series circuit.	Sort electrical appliance into those that require mains electricity and those that are powered by batteries.
Investigate which materials are conductors and which materials are insulators. Make predictions for different materials and record the results.	Create a simple buzz wire game.

## Medium Term Planning

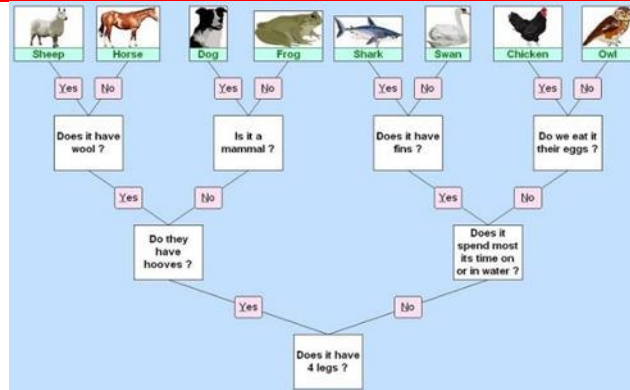
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
To know some common appliances that run on electricity and that electricity can come from the mains supply or from batteries.	To know the dangers associated with electricity.	To construct a simple circuit, identifying the basic parts, including cells, wires, bulbs, switches and buzzers.	To know that some materials are good conductors of electricity and some are poor conductors and associate metals with being good conductors.	To know 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.	To recognise that a switch opens and closes a circuit.

Year 4 – Spring 2		Living Things and their Habitat
Prior Learning		Next Steps
Year 1 – Identify and name common omnivores, herbivores and carnivores. Year 2 – Explore the differences between things that are living, dead or have never been alive. Year 3 – Nutrition and food groups		Year 6 – Linnaeus' classification key
<b>National Curriculum objectives:</b> <ul style="list-style-type: none"> <li>Recognise that living things can be grouped in a variety of ways</li> <li>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</li> <li>Recognise that environments can change and that this can sometimes pose dangers to living things.</li> <li>Explore and compare the differences between things that are living, dead, and things that have never been alive</li> <li>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other</li> <li>Identify and name a variety of plants and animals in their habitats, including micro-habitats</li> </ul>		
Knowledge Objectives		Scientific Skills
<ul style="list-style-type: none"> <li>To know that living things can be grouped in a variety of ways and that classification keys can be used to support this.</li> </ul>		<ul style="list-style-type: none"> <li>Ask relevant questions and use different types of scientific enquiries to answer them.</li> <li>Identify differences, similarities or changes related to simple scientific ideas and processes.</li> </ul>
Key Assessment Questions		
What are the seven characteristics of a living thing? Can you use a simple branching database to classify a living thing?		
Key Vocabulary		
Alive, dead, never been alive, movement, reproduction, sensitivity, nutrition, excretion, respiration, growth, habitat, local		
Knowledge to be taught (Gateway Knowledge in red)		



There are seven characteristics of a living thing and these can be remembered using the mnemonic MRS NERG:

- Movement: Animals usually move their whole body from one place to another, whereas plants move towards the light. Plant roots grow down into the soil towards water.
- Reproduction: Animals have babies. Plants produce seeds which grow into new plants.
- Sensitivity: Both plants and animals react and respond to what is happening around them, e.g. plants turn and grow towards light; animals see and hear danger and move away.
- Nutrition: Green plants make their own food using sunlight, carbon dioxide and water. Animals eat plants and/or other animals.



- Excretion: Plants and animals get rid of (excrete) carbon dioxide (a waste gas). Humans breathe it out. Deciduous trees get rid of waste products when their leaves fall in autumn. Animals also urinate and produce faeces.
- Respiration: Plants and animals use oxygen (from air) to help turn food into energy.
- Growth: Baby animals grow into adult animals and seedlings grow into bigger plants.

Living things are divided into kingdoms and plants and animals are two of these kingdoms:

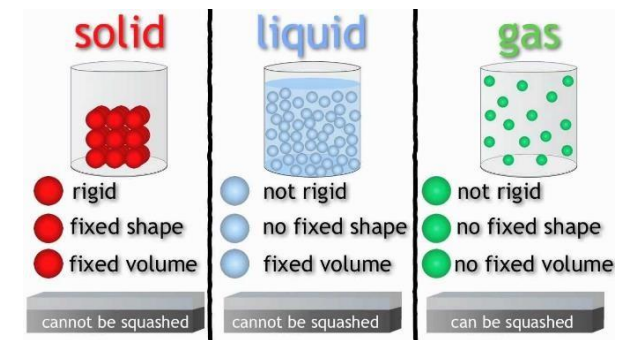
Animals		Plants	
Vertebrates	Invertebrates	Seed producing	Non-seed producing
Mammals Birds Fish Reptiles Amphibians	Arachnids (spiders) Insects	Algae Ferns Mosses	Flowering Plants Seeds

A branching database can be used to support the classification of living things.					
Definitions					
Vertebrate	An animal that has a backbone.				
Invertebrate	An animal that does not have a backbone.				
Scientific Enquiry					
Ask relevant questions about living things and their habitats and begin to group them.			Observe local habitats and record living things they see around them.		
Make close observational drawings and large-scale drawings. Understand that tiny details of features help with classification.			Write a branching database for a variety of living things in the wider environment.		
Medium Term Planning					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
To explore and compare the differences between things that are living, dead and things that have never been alive.	To identify that most living things live in habitats to which they are suited and describe how habitats provide for the basic needs of animals, plants.	To recognise that environments can change and this can sometimes pose dangers to living things.	To observe a microhabitat and record the living things that are seen.	To know that living things can be classified and different ways and know why this might be useful.	To know how to use a branching database/dichotomous classification key.

Year 4 – Summer 2		States of Matter
Prior Learning		Next Steps
Year 2 – To know that materials have different properties.		Year 5 – Properties and changing of materials – filtering, sieving and evaporating
<b>National Curriculum objectives:</b> <ul style="list-style-type: none"> <li>• Compare and group materials together, according to whether they are solids, liquids or gases</li> <li>• 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)</li> <li>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</li> </ul> <b>Cross-Curricular Links</b> Geography – The water cycle and the weather.		
Knowledge Objectives		Scientific Skills
<ul style="list-style-type: none"> <li>• To know how to compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>• To know that some materials change state when they are heated or cooled.</li> <li>• To know that part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>		<ul style="list-style-type: none"> <li>• Ask relevant questions, using different types of scientific enquiries to answer them.</li> <li>• Set up simple practical enquiries and comparative and fair tests.</li> <li>• Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.</li> <li>• Report on findings from enquiries, including oral explanations.</li> <li>• Using straightforward scientific evidence to answer questions or to support findings.</li> </ul>
Key Assessment Questions		
Can you name a solid/liquid/gas? Can you describe the features of a solid/liquid/gas? Can you describe the water cycle including what is meant by evaporation and condensation?		
Key Vocabulary		
Solid, liquid, state, matter, particle, grain, category, classify, evaporation, condensation, precipitation, vapour		
Knowledge to be taught (Gateway Knowledge in red)		

Materials can be grouped according to whether they are a solid, liquid or gas. This is called their state of matter.

- As solid can hold its shape, is rigid and cannot be squashed.
- A liquid takes the shape of the container that it is in, it is not rigid and it cannot be squashed.
- A gas will escape from an unsealed container, it is not rigid and it can be squashed.

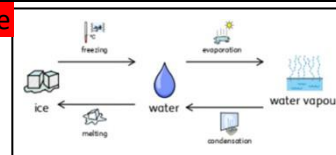


Solids	Liquids	Gas
Ice	Water	Water vapour (steam)
Chocolate	Blood	Air (Nitrogen, Oxygen and Carbon Dioxide)
Brick	Petrol	Helium
Glass	Milk	
Metal	Soup	

The state of some materials can be changed by heating or cooling them. For example water.

When heated, water evaporates to become water vapour. This happens at 100°C.

When cooled, water freezes and becomes ice. This happens at 0°C.



This can be seen in action in the water cycle.

Water in the oceans and rivers is heated by the sun. This causes the water to change from a liquid to a gas, producing water vapour. This process is called evaporation and it happens more quickly as the temperature increases.

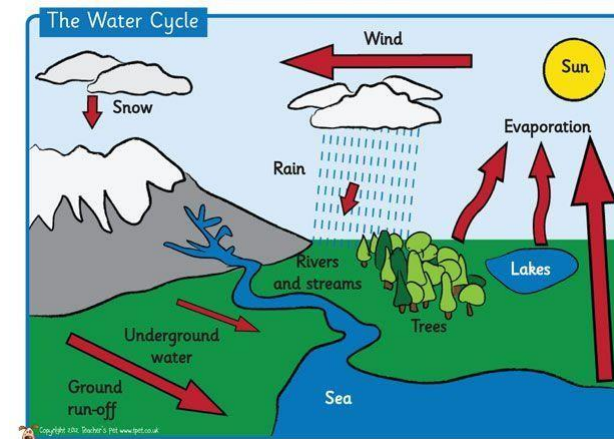
As more and more water vapour rises into the air it forms a large dense mass called a cloud.

These clouds are blown across the sky often for thousands of miles before they begin to cool.

This process is called condensation as the water vapour cools and becomes liquid again.

This falls to the earth as precipitation (rain, snow or hail).

The precipitation soaks in to the ground or runs off and eventually finds its way back into the rivers and oceans for the process to begin again.



## Definitions

Evaporation	The process of turning a liquid into a gas.
Condensation	The process of turning a gas into a liquid.
Precipitation	Rain, snow, sleet or hail that falls to the ground.

## Scientific Enquiry

Identify misconceptions and classify materials into solids, liquids and gases.	Investigate the presence of gases.
Understand the behaviour of particles in the different states and use a thermometer to observe temperature changes of water.	Investigate evaporation and condensation.
Understand and explain the water cycle using scientific language.	Demonstrate an understanding of states of matter by recreating a range of simple practical enquiries (exploring).

## Medium Term Planning

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
To know that materials can be classified into different states.	To understand gases.	To know that some materials change state when they are heated or cooled.	To know the meaning of the terms evaporation and condensation and how these processes form part of the water cycle.	To know that water moves in a cycle due to changes in temperature causing the water to change from one state to another.	Assessment Opportunity