



The Science Curriculum

Year 6

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"> Observe things closely through a variety of means (photos, magnifiers) With support, notice and discuss patterns around them. 	<ul style="list-style-type: none"> Explore the world around them and raise their own simple questions. Begin to recognise that there are different ways to answer a scientific question. Experience a variety of practical scientific enquiries. Carry out a simple test. Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (Identify and classify). Observe closely using simple equipment: pooters, magnifying glasses With guidance, begin to notice patterns and relationships. Use simple measurements and equipment to gather data (egg timers, lenses, magnifiers) Use observations and ideas to suggest answers to questions. 	<ul style="list-style-type: none"> Raise their own relevant questions about the world around them. Provide a range of different scientific experiences including different types of scientific enquiries to answer questions. Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions. Set up simple scientific enquiries, comparatives and fair tests. Recognise when a fair test is necessary and help to decide how to set it up. Talk about the criteria for sorting, grouping and classifying; and use simple keys. Make systematic and careful observations. 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. Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. Take accurate measurements using standard units. Learn how to use a greater range of equipment including data loggers and thermometers. 	<ul style="list-style-type: none"> Use their own science experiences to explore ideas and raise different kinds of questions. Talk about how scientific ideas have developed over time. Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions. Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. 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. Make decisions about what observations to make, what measurements to use and long to make them for. Look for different causal relationships in data and identify evidence that refutes or supports their ideas. Choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. Take repeat measurements where appropriate.
Communicating Scientifically	<ul style="list-style-type: none"> With support, talk about patterns and changes that have been seen. 	<ul style="list-style-type: none"> Record simple data. Talk about what you have found out and how you have found out. With support, record and communicate findings in a range of ways, beginning to use simple scientific language. 	<ul style="list-style-type: none"> 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. Look for changes, patterns, similarities and differences in data in order to draw simple conclusions and answer questions. 	<ul style="list-style-type: none"> 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. Identify scientific evidence that has been used to refute or support ideas or arguments. 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. Use results to make predictions and identify when further observations, comparative and fair tests might be needed.
Animals, including humans	<ul style="list-style-type: none"> Identify and name some common animals. This will be linked to personal experiences such as pets, books or days out with family. 	<ul style="list-style-type: none"> Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores. Understand that animals, including humans, have offspring which grow into adults. Describe the basic needs of animals, including humans, for survival: water, food, air Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. 	<ul style="list-style-type: none"> 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. Know that humans and some other animals have skeletons and muscles for support and movement. Know the basic functions of the human digestive system. Know the types of teeth in the human mouth and their function. Know how to construct and interpret a food chain, identifying predators, prey and producers. 	<ul style="list-style-type: none"> Know how humans develop and change to old age. Know how to group plants, animals and microorganisms based on common, observable characteristics. Give reasons for the classification chosen. Know the main parts of the human circulatory system. Know the functions of the heart, blood vessels and blood. Know what impact diet, exercise, drugs and lifestyle has on the function of the human body. Know how water is transported within animals.

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

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

Evolution and Inheritance				<ul style="list-style-type: none">• Know that living things have changed over time.• Know that fossils provide information about livingthings that inhabited the earth millions of years ago.• Know that living things produce offspring of the samekind, but that normally offspring vary and are not identical to their parents.• Know that animals have adapted to suit their environment in different ways and that this adaption may lead to evolution.
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Year 6 – Autumn 1		The Human Circulatory System
Prior Learning		Next Steps
Year 2 – The basic needs of animals Year 4 – The human digestive system		Key Stage Three – Gas exchange systems in humans
<u>National Curriculum</u> Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood <ul style="list-style-type: none"> Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function <u>Cross-Curricular Links</u> PSHE – How do your lifestyle choices affect the health of your heart?		
Knowledge Objectives		Scientific Skills
<ul style="list-style-type: none"> To know that the heart is a muscle that pumps blood to all parts of the body. To know the three types of blood vessels: arteries, veins and capillaries To know the components that make up blood. 		<ul style="list-style-type: none"> Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. Report and present findings from enquiries, including conclusions, causal relationships and explanations of results. Identify scientific evidence that has been used to support or refute ideas or arguments.
Key Vocabulary		
Blood, blood vessels, arteries, veins, capillaries, heart, pumps, oxygen, carbon dioxide, lungs, nutrients, water		

Knowledge to be taught (Gateway knowledge in red)

The human circulatory system is a group of organs and vessels which transports blood around the body.

The Heart

- The heart is a powerful muscle that is situated between your lungs, protected by the ribcage. It pumps deoxygenated blood to the lungs to get oxygen and then it pumps oxygenated blood to the rest of the body.
- The heart has four chambers: the left atrium, the right atrium, the left ventricle and the right ventricle. These chambers are separated by valves.

Blood

Blood is made of four components, each with a specific function:

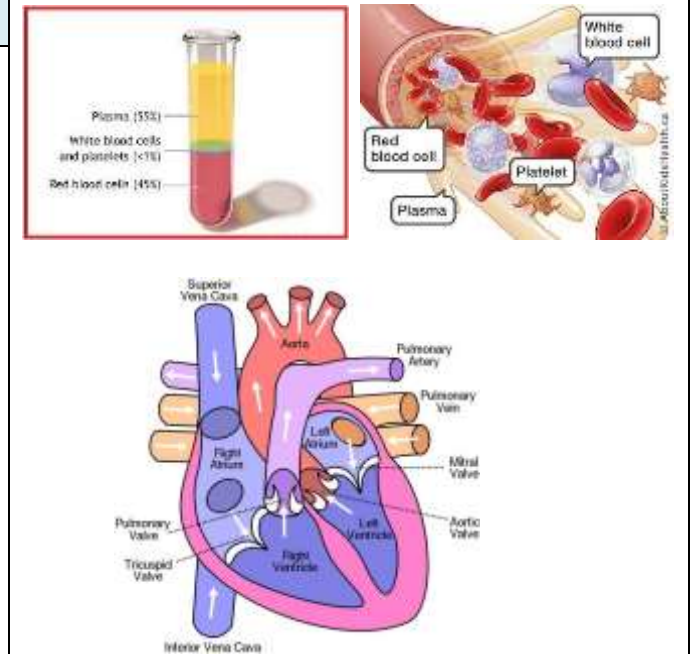
- Plasma – Transports nutrients, hormones and proteins around the body.
- Red Blood Cells – Transport oxygen throughout the body
- White Blood Cells – Form a key part of the immune system to fight off infection.
- Platelets – Supports blood to clot.

Blood Groups

There are two main blood types: ABO and Rhesus.

The ABO blood type has 4 main types: Type A, Type B, Type AB and Type O

There are 8 main blood groups in total: O Negative, O Positive, A Negative, A Positive, B Negative, B Positive, AB Negative, AB Positive



The blood transports water and other nutrients around the body in a collection of different vessels (tubes). There are three types:

Arteries – carry oxygenated blood away from the heart.

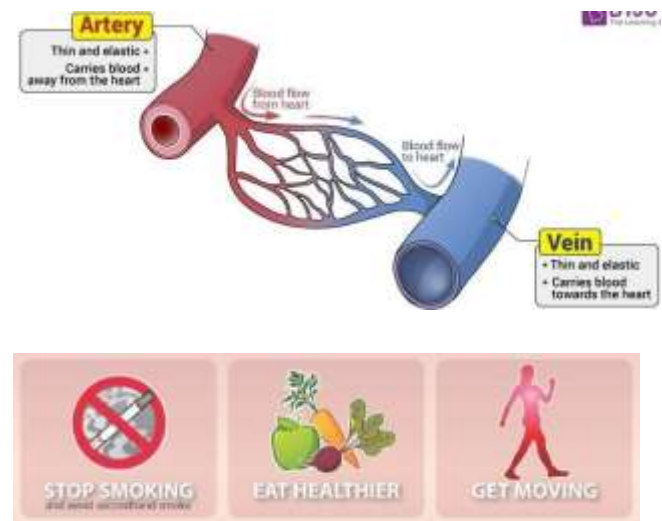
Veins – carry deoxygenated blood to the heart where it is pumped to the lungs to be re-oxygenated.

Capillaries – Connect arteries and veins and allow the movement of water, oxygen and carbon dioxide and many other nutrients between them. This happens by two processes: diffusion and osmosis.

How might my lifestyle effect the health of my heart and blood vessels?

Coronary heart disease is the biggest killer in the UK. Every 8 minutes, someone in the UK dies of coronary heart disease.

- **A high fat, high salt diet** can have an adverse effect on the heart and blood vessels. This can lead to heart disease and heart attacks.
- **Smoking** tobacco causes the inner walls of the arteries to become stickier than usual. This allows fatty material in the blood to stick to them forming blockages. These blockages can lead to a heart attack.
- **Illegal drugs** can have adverse cardiovascular effects, ranging from abnormal heart rate to heart attacks.



Definitions

Hormone	A substance that stimulates specific cells into action.
Coronary	Relating to the circulatory system.
Nutrient	A substance that provides nourishment essential for the maintenance of life and for growth.
Adverse	Harmful
Cardiac Arrest	More commonly known as a heart attack. A sudden ending of the normal function of the heart.

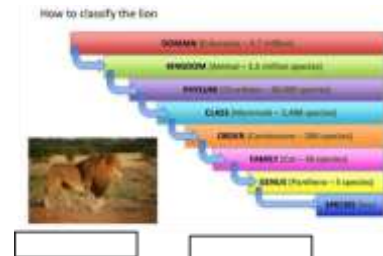


Scientific Enquiry

Heart rates and physical exertion - a dramatic representation.
Circulatory system sculptures.
Heartbeat sound installation.

Documentary on diet, exercise, drugs and lifestyle.

Medium Term Planning

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
To know the names and functions of the main organs in the human body Locate the main organs in the human body.	To know the heart is a muscle. Name the components of the heart and their functions.	To understand how to keep a healthy heart and know the impact it has on our lifestyles.	To carry out a fair test investigation. Understand how exercise affects heart rate.	To carry out a fair test investigation. Understand how exercise affects heart rate.	To know the components of blood and understand its journey through the human body.	To write a non-chronological report about the human body.

Year 6 – Autumn 2		Classification
Prior Learning		Next Steps
Year 4 - Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.		KS3: Structure and function of the parts of cells. Structural adaptations of unicellular organisms
National Curriculum Objectives: <ul style="list-style-type: none">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 animalsGive reasons for classifying plants and animals based on specific characteristics.		
Knowledge Objectives	Scientific Skills	
<ul style="list-style-type: none">Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.Give reasons for classifying plants and animals based on specific characteristics.	<ul style="list-style-type: none">Plan different types of scientific enquiries to answer questions.Record results of increasing complexity using scientific diagrams and labels, and classification keys.Identify scientific evidence that has been used to support or refute ideas or arguments.Record data and results of increasing complexity using classification keys.Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.	
Key Vocabulary		
classification, kingdom, phylum, class, order, family, genus, species		
Assessment Questions		
What were the three domains in Carl Linnaeus’ classification system? Which domain do humans fit into? Can you name the five types of microorganisms? Which one does Covid-19 fit into?		
Knowledge to be taught (Gateway knowledge in red)		
<p>Carl Linnaeus developed a classification system that is still in use today.</p> <ul style="list-style-type: none">There are 3 domains: Archaea, Bacteria and Eukarya. Plants and animals are all eukaryotes.There are 6 kingdoms, including animals, plants, fungi and bacteria.The 6 kingdoms are then split into phyla. There are more than 30 phyla in the animal kingdom. Phylum chordata includes all vertebrates.Each phyla is divided into classes. The chordata phylum includes amphibians, birds, mammals, reptiles and fish.The order and the family divide into further groups.The genus includes species that are very closely related and share unique body structures.A species is defined as a group of animals that can reproduce to produce fertile offspring.		
<div><div><p>How to classify the lion</p></div><div><p>Salmonella enteritidis</p></div><div><p>Covid-19</p></div></div>		
<p>Microorganisms</p> <p>Microorganisms cannot be seen with the naked eye. You need a powerful microscope to see them. There are five types of microorganism: Bacteria, viruses, fungi, protozoa and algae</p>		

Bacteria: Single celled spherical, spiral or rod shaped organisms eg. *Salmonella enteritidis*

Viruses: Parasites that survive by living inside the cells of living things eg. Chicken Pox, Measles and Covid-19

Fungi: Fungi can be seen in many shapes and sizes from single celled yeasts to moulds, mushrooms and toadstools.

Protozoa: Single celled organisms which cause diseases such as malaria and sleeping sickness.

Algae: Can be many different sizes from single celled diatoms found in toothpaste to macroscopic (larger) algae which contain many cells like seaweed.



Yeast Cells



Malaria inside human cells



Algae

Definitions

Classification	The arrangement of animals and plants in taxonomic groups according to their observed similarities
Taxonomic	Concerned with the classification of things, especially organisms.
Kingdom	Each of the three traditional divisions (animal, vegetable, and mineral) in which natural objects have conventionally been classified.
Phylum	A principal taxonomic category that ranks above class and below kingdom
Class	A principal taxonomic grouping that ranks above order and below phylum or division
Order	A principal taxonomic category that ranks below class and above family.
Family	A principal taxonomic category that ranks above genus and below order.
Genus	A principal taxonomic category that ranks above species and below family.
Species	The species is the principal natural taxonomic unit, ranking below a genus.

Scientific Enquiry

Classify living things using the Linnaeus Classification System Give children a range of different living things. Predict which are closely related. Research classification routes online and find out which are the most closely related/least closely related.	Find the odd one out from a group of living things. Can you spot which living thing has been placed in the wrong kingdom or phylum?
Use a branching database (a type of classification key) to classify a plant.	Create a classification key for a new type of plant/animal.
Outside Activity – Classification of native and non-native trees. Collect leaf specimens, take photographs of leaves and bark. Classify trees and match to their leaf shapes. Record using drawings.	Write scientific descriptions of unusual animals from around the world using Linnaeus' classification system.
Food Spoilage and microorganisms.	

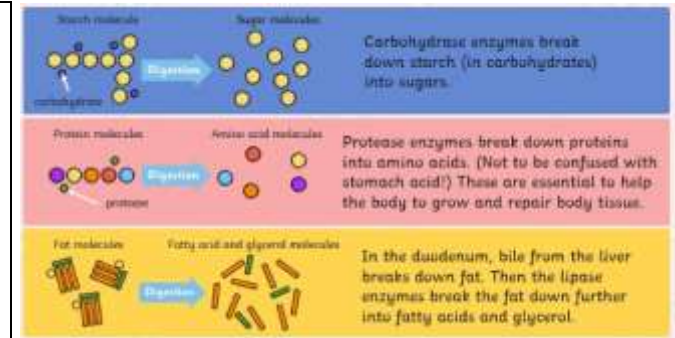
Medium Term Planning –

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
To know who Linnaeus was and learn about his classification system.	To know how to use a classification key to sort living things according to observable characteristics.	To know how to develop a classification key and how to test it for potential flaws.				

Year 6 – Spring 1		Nutrient and Water Transport in Humans
Prior Learning	Next Steps	
Year 3 - Food groups and their importance for humans. Year 4 – Teeth and the human digestive system.	<u>Key Stage Three</u> Tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes as biological catalysts). The importance of bacteria in the human digestive system.	
<u>National Curriculum Objectives:</u> •Describe the ways in which nutrients and water are transported within animals, including humans <u>Cross-curricular links</u> History – How did rationing in World War II affect the health of the nation? PSHE – How do your lifestyle choices affect your health?		
Knowledge Objectives		Scientific Skills
<ul style="list-style-type: none">To know that protein, carbohydrate and fat molecules are broken down into smaller molecules by stomach acid and enzymes.To know that nutrients are absorbed into the body in the small intestines. From here they are transported into the bloodstream.To know that water is mainly absorbed through the small and large intestines and into the bloodstream.To know that the kidneys filter waste out of the body and that urine is excreted through the bladder and urethra.		<ul style="list-style-type: none">Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.Identify scientific evidence that has been used to support or refute ideas or arguments.
Key Vocabulary		
Nutrients, chyme, duodenum, enzyme, starch, molecule, convert, protein, amino acid, fatty acid, glycerol, villi, artery, vein, contract, relax, absorb, expulsion		
Key Assessment Questions		
Which two substances help to break carbohydrate, protein and fat into smaller molecules? In which part of the digestive system are nutrients absorbed? What is the function of bacteria in the large intestine? Where is water absorbed into the blood stream?		
Knowledge to be taught (Gateway knowledge in red)		

How are nutrients absorbed by the human body?

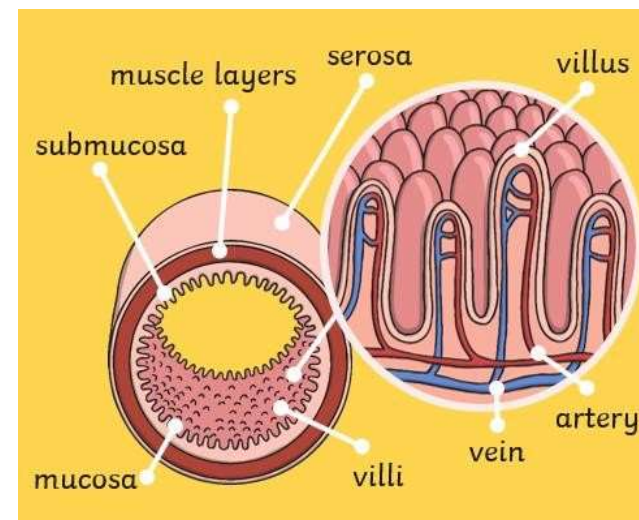
- Stomach acids break food down into a substance called chyme. This passes through to the duodenum where bile and enzymes break up larger molecules into their smaller parts:
 - Starch molecules are converted to sugar molecules.
 - Protein molecules are converted to amino acid molecules.
 - Fat molecules are broken down into fatty acid and glycerol molecules.
- After the nutrients have been broken down into smaller separate molecules in the duodenum, they can then pass through to the rest of the small intestine, where they are absorbed into the blood stream.



- The small intestine is a muscular tube with several layers. It is lined with tiny hair like villi which are attached to arteries and veins.
- The chyme (which now contains smaller broken-down nutrient molecules) is moved back and forth in the small intestine. The nutrients pass through the villi and are absorbed into the blood vessels.
- Bacteria in the large intestine break down waste food for any more nutrients which are absorbed. This process also leads to gas which is eventually passed through the anus.

How is water absorbed by the human body?

- Water enters the body in the mouth. Unlike other nutrients it is not broken down by enzymes or bile.
- A small amount of water is absorbed through the stomach but the majority passes through to the small intestine.
- Water is absorbed in the small intestine in the exact same way as other nutrients are absorbed – through the villi into bloodstream via the blood vessels.
- The large intestine (also called the colon) is similar to the small intestine in structure except that it does not contain villi. By the time waste material reaches the large intestine, 90% of water has already been absorbed.
- The waste food enters into the cecum which is the first part of the large intestine. It moves through the large intestine through a series of **mass movements**. These are long, slow moving waves of muscles contracting and relaxing. The rest of the water in the waste food is absorbed in all the different parts of the colon. The resulting stool and any gases are moved to the sigmoid colon. It is this part of the large intestine that enables gases to be released without releasing stools at the same time. The stools then enter the rectum before expulsion through the anus.



Definitions

Nutrient	A substance that provides nourishment essential for the maintenance of life and for growth.
Chyme	The pulpy acidic fluid which passes from the stomach to the small intestine, consisting of gastric juices and partly digested food.
Enzyme	A substance produced by a living organism which acts as a catalyst to bring about a specific reaction.
Catalyst	A substance that increases the rate of a chemical reaction without itself undergoing any permanent chemical change.
Villus/Villi	Finger like or threadlike projections from the surface of certain membranous structures.
Absorb	Take in or soak up by physical action.
Expel/Expulsion	To force out, especially from the body.

Scientific Enquiry

Plot the journey of water and food through the human body.	Documentary on diet, exercise, drugs and lifestyle.

Medium Term Planning					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
To know how enzymes break down food molecules.	To know how nutrients are absorbed by the human body.	To know how water is absorbed by the human body.	To know how waste is absorbed by the human body.		

Year 6 – Spring 2	Topic: Tomorrow’s World	Electricity
Prior Learning	Next Steps	
Year 4 – Construct a simple series circuit using cells, wires, bulbs, switches and buzzers. Understand that the position of a switch will decide whether a bulb will light. Know some common conductors and insulators of electricity and associate metals with being good conductors.	Key Stage Three - Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference to current Differences in resistance between conducting and insulating components (quantitative).	
<u>National Curriculum Objectives</u> <ul style="list-style-type: none">Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuitCompare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switchesUse recognised symbols when representing a simple circuit in a diagram. <u>Cross-Curricular Links</u> DT – Using design criteria to create a product.		
Knowledge Objectives	Scientific Skills	
<ul style="list-style-type: none">To know the symbols that are used in a simple circuit diagram.To know that the brightness of a bulb or the volume of a buzzer will increase when more cells are added to a circuit or when the voltage of the cells are increased.To know the variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.	<ul style="list-style-type: none">Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.Record data and results of increasing complexity using tables, scatter graphs, bar and line graphs.Use test results to make predictions to set up further comparative and fair tests.	
Key Vocabulary		
Electricity, electrical circuit, complete circuit, circuit symbol, components, cell, battery, positive/negative, connect/connection, loose connection, wire, crocodile clip, bulb, bright/dim, switch, buzzer, volume, motor, fast(er)/slow(er), voltage, current, conductor, insulator, metal/non metal, enquiry question, investigation, findings		
Key Assessment Questions		
Can you name each of the key symbols used in a simple circuit diagram? Can you explain what current/voltage/resistance is?		
Knowledge to be taught (Gateway knowledge in red)		

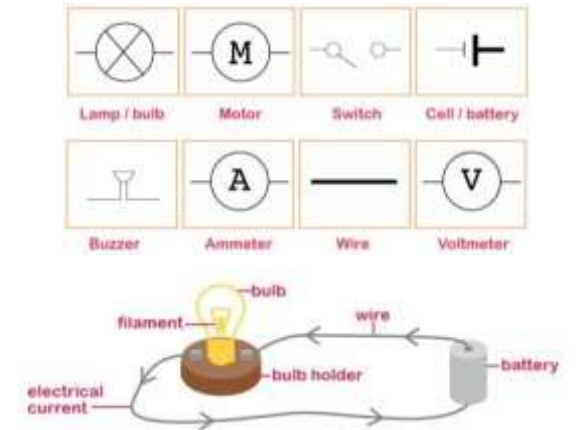
Important safety teaching point: Experimenting with battery powered circuits presents no danger however mains electricity is very dangerous and must not played with.

A simple series electrical circuit is a circuit for electricity to flow around.

be brighter or a
amount of voltage

If more cells were added to this circuit then the bulb would
buzzer would be louder. This is because it increases the
in the circuit.

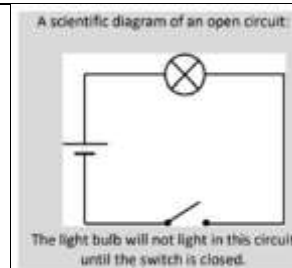
- Electricity is most often generated at a **power plant by electromechanical generators**, primarily driven by heat engines fueled by combustion or nuclear fission but also by other means such as the kinetic energy of flowing water and wind. Other energy sources include solar photovoltaics and geothermal power.



Electricity flows around the circuit and through each of the components. The amount of electricity flowing through the circuit is called the **current**. Current is measured in amps.

Voltage is the name for the electric force that causes electrons to flow. It's the measure of potential difference between two points in the circuit. Voltage may come from a battery or a power plant. Voltage is measured in volts.

The wires and the other components in a circuit reduces the flow of charge through them. This is called **resistance**.



Definitions

Component	A part or element of a larger whole.
Current	The amount of electricity flowing through a circuit
Voltage	The difference in electrical energy between two parts of a circuit.
Resistance	The reduction in flow of the electrical charge as it flows through components in a circuit.

Scientific Enquiry

Investigate a range of simple electric circuit challenges (planning/fair testing/exploring)	Investigate the effects of voltage and number of components on a working circuit.
Explore resistance through the use of various components. Draw circuit diagrams.	Design and create a light decoration circuit.

Medium Term Planning

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
To understand where electricity is generated and explain the journey it makes	To recognise and draw symbols for each component To draw circuit diagrams accurately	To make simple circuits from circuit diagrams To make parallel circuits and understand their role within our houses	To investigate components within a circuit and carry out a fair test.	To investigate components within a circuit and carry out a fair test.	To understand the danger associated with electricity and how to stay safe.

Year 6 – Summer 1		Inheritance and Evolution
Prior Learning		Next Steps
Year 2 – Know that animals produce offspring.		Key Stage Three – A simple model of DNA. Continuous and discontinuous variation
<u>National Curriculum objectives</u> <ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. <u>Cross-Curricular Links</u> Geography- Links to Mexico and archaeology Religious Education – Views on the origins of the universe.		
Knowledge Objectives		Scientific Skills
<ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. 		<ul style="list-style-type: none"> • Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. • Identify scientific evidence that has been used to support or refute ideas or arguments.
Key Vocabulary		
Offspring, characteristics, vary/variation, inherit/inheritance, environmental variation		
Key Assessment Questions		
Can you name some common inherited characteristics? Can you name some non-inherited characteristics? When children are born they look similar, but not identical to their parents. Can you explain why? Can you describe an advantageous adaption?		
Knowledge to be taught (Gateway Knowledge in red)		

Living things produce offspring of the same species. Some of a parent's characteristics are passed down to the offspring – this is called inheritance. This is why we often share similar features with our parents. For example: eye colour, height, hair colour.

Not all of our characteristics are inherited from our parents. These are called non-inherited characteristics and include: food preferences, favourite colour, favourite types of music.

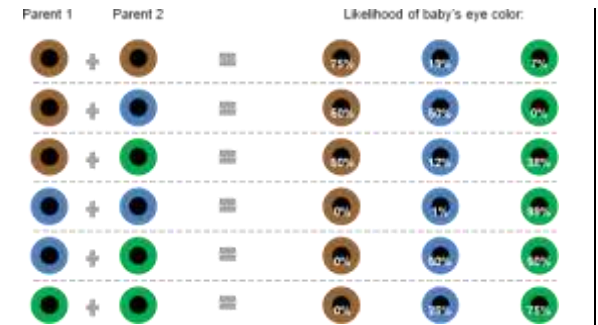
Sometimes a characteristic can be new to offspring and this is most often down to a mutation. This is another reason why we are not exact copies of our parents.

These changes to offspring over time lead to a process called evolution.

Adaption

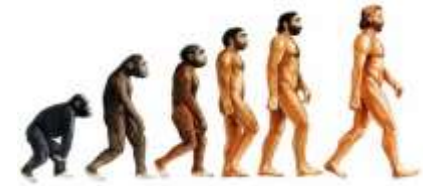
Sometimes, changes that offspring have from their parents are advantageous – they allow their offspring to cope better in their environment.

For example, many polar animals have adapted to possess layers of blubber and/or fur (for warmth) and white outer coats (for camouflage). These adaptations are advantageous.



Some adaptations are non-advantageous, for example, dodos had adapted to live without predators but then were unable to survive when humans arrived on their islands.

Natural selection can ensure that, over time, the advantageous characteristics survive in the species.



Definitions

Offspring	An animal's young.
Species	A group of living organisms consisting of similar individuals
Characteristic	A feature or quality belonging to a person.
Inherit	To derive (a quality, characteristic, or predisposition) genetically from one's parents.
Mutation	The changing of the structure of a gene, resulting in a variant form that may be transmitted to subsequent generations.
Evolution	The process by which different kinds of living organism are believed to have developed from earlier forms during the history of the earth.
Natural Selection	The process whereby organisms better adapted to their environment tend to survive and produce more offspring.

Scientific Enquiry

Identify things that are inherited and things that are learned. Explore variation through dog breeds.	Identify features that support survival in a given environment.
Meet Darwin, Anning and Wallace and explore the role of fossils in scientific understanding of evolution.	Use the principles of biscuit evolution to animal and plant evolution.

Medium Term Planning

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
To know that variation occurs within offspring as well as across a species.	To know that there are advantages and disadvantages of certain characteristics.	To know that animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	To know that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.		

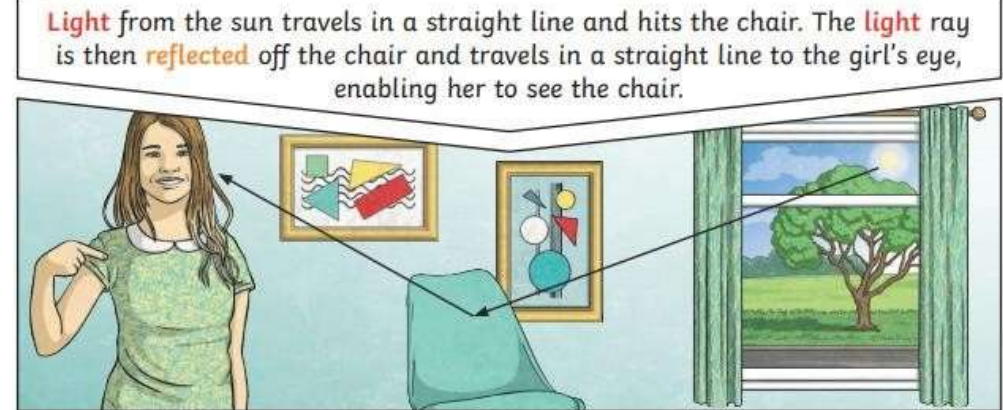
Year 6 – Summer 1		Light	
Prior Learning		Next Steps	
Year 2 – Properties of materials including their transparency. Year 3 – Notice that light is reflected from surfaces. Recognise that shadows are formed when a light source is blocked by an opaque object. Find ways to change the size of a shadow.		<u>Key Stage Three</u> The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. Light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras. Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.	
<u>National Curriculum Objectives:</u> <ul style="list-style-type: none">• Recognise that light appears to travel in straight lines• 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• Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. <u>Cross-Curricular Links</u> PSHE – Sun Safety and the dangers of looking directly at the Sun.			
Knowledge Objectives		Scientific Skills	
<ul style="list-style-type: none">• To know that light appears to travel in straight lines.• To know that objects can be seen because they give out or reflect light into the eye.• To know that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.• To know why shadows have the same shape as the objects that cast them.		<ul style="list-style-type: none">• Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary• Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate• Recording data and results of increasing complexity using scientific diagrams and labels, tables, bar and line graphs• Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations	
Key Vocabulary			
light, light source, names of light sources, dark, reflect, reflective, mirror, shadow, block, absorb, direct/ direction, transparent, opaque, translucent, straight, rainbow, colours			
Key Assessment Questions			
Can you describe how light travels? Can you explain the law of reflection? How is a shadow produced? Can you explain what the term transparent/ translucent/opaque means?			

Knowledge to be taught (Gateway knowledge in red)

We need light to be able to see things.

Light travels as a wave but unlike sound waves or water waves, it doesn't need a medium to travel through. This means that light can travel through a vacuum (a completely airless space). Light waves travel out from light sources in straight lines and these are often called rays of waves of light.

Light travels from a light source in a straight line. It will either travel in a straight line into a person's eye or it will reflect off an object and then into a person's eye.

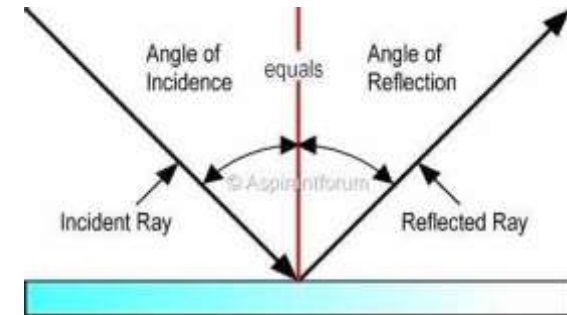


The Law of Reflection

The Law of Reflection states that the angle of incidence is equal to the angle of reflection. Whenever light is Reflected from a surface it obeys this law.

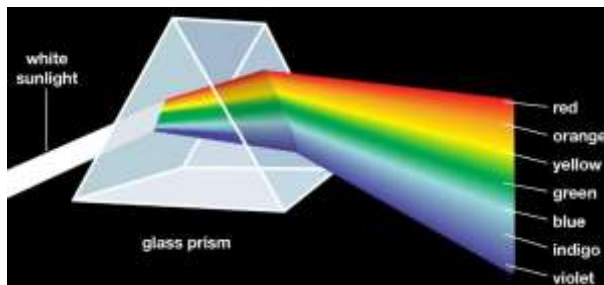
The angle of reflection is the angle between the normal line and the reflected ray of light.

The angle of incidence is the angle between the normal line and the incident ray of light.

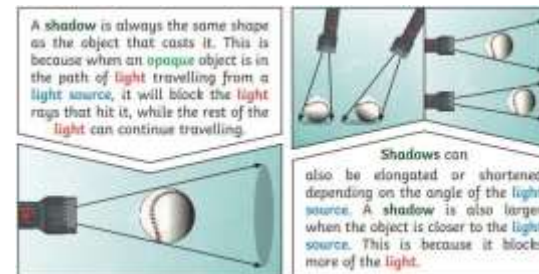


Prisms

Isaac Newton shone white light through a prism, separating light out into the colours of the rainbow: Red, Orange, yellow, green, blue, indigo, violet. These are called the colours of the spectrum. All of the colours merge together to make visible, white light.



PLANE MIRROR



Definitions					
Light	A form of energy that travels in waves from a source.				
Light Source	An object that makes its own light.				
Reflection	When light bounces off a surface, changing the direction of the ray of light.				
Incident Ray	A ray of light that hits a surface.				
Reflected ray	A ray of light that the has bounced off after hitting a surface.				
Visible spectrum	Light that is visible to the human eye. It is made up of a colour spectrum.				
Prism	A solid 3D shape with flat faces. The two ends are equal in shape and size. A transparent prism separates white light into the colour spectrum.				
Shadow	An area of darkness where light waves have been blocked.				
Transparent	Describes objects that will let light travel through them with ease, meaning you can see through the object.				
Translucent	Describes objects that will let some light through but then scatters the light so that we are unable to see through them.				
Opaque	Describes objects that do not let any light pass through them.				
Scientific Enquiry					
Investigate a range of simple light challenges.	Investigate and demonstrate that light travels in straight lines (exploring)				
Investigate how light reflects (make a periscope).	Investigate shadows and how they change as a result of light sources.				
Explore split light (finding ‘rainbows’).	Investigate coloured light mixing.				
Medium Term Planning					
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
To investigate light.	To know that light travels in straight lines and that a light source is needed.	To know and describe how light reflects from mirrors.	To know how a shadow is formed and why it is the same shape as the object that casts it.	To know that a transparent prism will separate white light into the 7 colours of the rainbow.	To know that coloured light can be mixed to create new colours.