













Science at Balderstone

<p>EYFS</p> 	 <p>Animals including Humans</p>	 <p>Forces</p>	 <p>Plants</p>	 <p>Materials and their properties</p>
	<p>Animals (humans)                      - features                      Songs: Head, shoulders knees &amp; toes                      This is the way we (clap our hands)</p> <p>Animals - recognising and naming</p>	<p>Forces -                      Moving toys                      Malleable materials - playdough</p>	<p>Plants &amp; Living Things - Exploring locality in different seasons</p>	<p>Materials - Exploring made &amp; natural (soft, hard, rough, smooth)                      Feely bags</p> <p>Materials around the classroom -                      Sand, water, other liquids, mud                      Investigating Shadows - human shadow play                      Puppets/light box</p>
<p>EYFS</p> 	 <p>Animals including Humans</p>	 <p>Forces</p>	 <p>Plants</p>	 <p>Materials and their properties</p>








<p>Books, practical resources and fieldwork experiences will thread throughout the EYFS curriculum</p>	<p>Animals (humans) - features: observational drawings links to senses - nose to smell, ears to hear (sound)</p> <p>Animals - (categories &amp; features) pets, farm, zoo, woodland Similarities &amp; differences between animals</p>	<p>Forces - Floating &amp; Sinking Flying Falling Balancing Moving themselves (links to P.E.) Beginning to explore magnetic attraction</p>	<p>Plants &amp; Living Things - (growing) - Exploring plants: trees, flowers, vegetables, fruit, weeds, herbs, house plants, grass Planting &amp; making observations Name features of a plant - leaf, roots, flower, stem, trunk, branches</p>	<p>Materials - Cooking/melting</p> <p>Materials - Floating &amp; Sinking Investigating Light, Darkness &amp; Shadows - 'Kipper's Monster' by Mick Inkpen</p>
<p>Disciplinary knowledge - Being a Balderstone Scientist</p>				
<p>Disciplinary knowledge - Being a</p>	<p>As a KS1 Balderstone Scientist I am skilled at:          asking simple questions and recognising that they can be answered in different ways          observing closely, using simple equipment          performing simple tests          identifying and classifying</p>			



<p>Balderstone Scientist</p>	<p>using their observations and ideas to suggest answers to questions gathering and recording data to help in answering questions</p>				
	<p><b>Animals including Humans</b> Humans. Animals</p>		<p><b>Plants</b></p>	<p><b>Materials and their properties</b></p>	
	<p>I am able to: <u>Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</u></p> <p>I recognise that humans are animals.</p> <p>I can compare and describe differences in my own <b>features</b> (eye, hair, skin colour, etc.). Recognise that humans have many <b>similarities</b>. I (through provision, research and cross-curricular learning) have learnt the names of the main body parts (including <b>head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth,</b></p>	<p><u>Identify and name a variety of common animals including some fish, some amphibians, some reptiles, some birds and some mammals.</u></p> <p><u>Identify and name a variety of common animals that are carnivores, herbivores and omnivores (i.e. according to what they eat).</u></p> <p><u>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, and including pets).</u> Find out and describe how animals look different to one another.</p>	<p>I can <u>identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.</u> <u>Identify and describe the basic structure of a variety of common flowering plants, including trees (at least: flower, leaf, root, stem, trunk, seed, branch and petal).</u> Our Balderstone I use our local environment throughout the year to explore and answer questions about plants growing in their <b>habitat</b> (through local walks,</p>	<p>I know and can explain how plants grow: <u>Observe and describe how seeds and bulbs grow into mature plants</u></p> <p><u>Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy (and how changing these affects the plant)</u> Plants are <b>living</b> and eventually die</p> <p>I use our local Balderstone environment throughout the year to observe how different plants grow.</p>	<p>I know how to: <u>distinguish between an object and the material from which it is made.</u> <u>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, rock, brick, paper and cardboard.</u> <u>Describe the simple physical properties of a variety of everyday materials.</u> <u>Compare and group together a variety of everyday materials on the basis of their simple physical properties.</u></p> <p>I know how to explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: <b>hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; flexible/rigid; waterproof/not waterproof; absorbent/not absorbent; opaque and transparent.</b> I at Balderstone explore and experiment with a wide variety of materials, including for example: brick, paper, fabrics, elastic, foil.</p>



	<p>teeth) through games, actions, songs and rhymes.</p>  <p>Compare and contrast animals (humans) at first hand or through videos and photographs. Using their senses to compare different textures, sounds and smells.</p>	<p>Group together animals according to their different features. Recognise similarities between animals: Structure: <b>head, body, way of moving, senses, body covering, tail.</b> Animals have <b>senses</b> to explore the world around them and to help them to survive. Recognise that animals need to be treated with care and <b>sensitivity</b> to keep them alive and healthy. Animals are <b>alive</b>; they <b>move, feed, grow</b>, use their senses and <b>reproduce</b>.</p>	<p>Forest School, gardening)</p> <p>I observe the growth of flowers and vegetables that I/we have planted.</p> <p>I am familiar with common names of flowers, examples of <b>deciduous</b> and <b>evergreen</b> trees, and plant structures (including <b>leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem</b>).</p>	<p>I know the requirements of plants for <b>germination</b>, growth and survival, as well as the process of reproduction and growth in plants.</p> <p>I know that seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.</p>	<p>I can identify and compare the <b>suitability</b> of a variety of everyday materials, including <b>wood, metal, plastic, glass, brick, water, rock, paper and cardboard</b> for particular uses</p> <p>I have found out how the shapes of solid objects made from some materials can be changed by <b>squashing, bending, twisting and stretching (applying a force)</b></p> <p>I know and can name some materials that can be found naturally; others have to be made (<b>natural, man-made, synthetic</b>)</p> <p>I work scientifically by: <b>performing simple tests to explore questions</b>, for example: 'What is the best material for an umbrella for Acorn the Squirrel? ...for lining a dog basket? ...for curtains in the Little Pigs' House? ...for a bookshelf? ...for a superhero cloak?'</p>
	 <p>Earth in Space - Light and Astronomy</p>	 <p>Living things and their Habitats</p>	 <p>Human Health</p>		
	<p>I know how to: <u>Observe and describe changes across the four seasons (different seasons taught each term)</u></p>	<p>I know how to: <u>Explore and compare the differences between things that are living, dead, and things that have never been alive.</u></p>	<p>I know that humans have <b>offspring</b> which grow into adults.</p> <p><u>I know and can describe the basic needs of humans, for survival (water, food and air).</u></p>		



	<p><u>Observe and describe weather associated with the seasons and how day length and temperature varies.</u></p> <p>I observe and talk about changes in the weather and the seasons.</p> <p>I know that it is not safe to look directly at the Sun, even when wearing dark glasses.</p> <p><b>I can work scientifically by:</b>  <b>Making tables and charts</b> about the weather and <b>Making displays</b> of what happens in the world around them, including day length, as the seasons change.</p> <p>Computing across the curriculum          Children learn how to use <b>data logging equipment to record temperatures/use data programs to display results</b></p>	<p><u>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.</u></p> <p><u>I am able to identify and name a variety of plants and animals in their habitats, including micro-habitats.</u></p> <p><u>I can 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.</u></p> <p>Different kinds of plants and animals live in different kinds of places.</p> <p>I know (through outdoor learning and Forest school sessions) that there are different kinds of habitat near Balderstone school which need to be cared for - stream, hedgerow, field)</p> <p>I know that habitats provide the preferred conditions for the animals/plants that live there (compare local habitats and less familiar examples).</p> <p><u>I know how to observe living things in their habitats and how these change during different seasonal changes (linked to Earth in Space unit)</u></p> <p>I know that all living things have certain characteristics that are essential for keeping them alive and healthy.</p>	<p><u>I can describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</u></p> <p>I know that medicines can be useful when we are ill but they can be harmful if not used properly.</p> <p>I know that all living things reproduce and have babies/offspring/seeds</p> <p>I know that when humans grow into adults they go through the baby, toddler, child, teenager, adult stages.</p> <p><b>I have observed, through first-hand observation and measurement</b>, how humans grow.</p> <p>I have <b>recorded</b> my findings using charts. I have <b>asked questions</b> about what things animals [humans]. need for survival and what humans need to stay healthy and suggested ways to find answers to my questions.</p>
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		<p>I know how to raise and answer questions about life processes that are common to all living things.</p> <p>I know the difference between a 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter).</p> <p>I know why it is so important to look after the local environment because living things depend on each other, for example plants serving as a source of food and shelter for animals.</p> <p>I can compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest (linked to Geography unit of learning)</p> <p>I know how to be a Balderstone scientist by:  <b>Sorting and classifying</b> things as to whether they are living, dead or were never alive.  <b>Recording</b> their findings using charts  <b>Describing</b> how they decided where to place things,  <b>Exploring questions</b> such as: 'Is a flame alive? Is a deciduous tree dead in winter?'  <b>Talking about ways of answering their questions.</b>  <b>Constructing a simple food chain</b> that includes humans (e.g. grass, cow, human);</p>	
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## Science - Knowledge Learning and Skill Progression



		<p><b>Describing</b> the conditions in different habitats and micro-habitats (under log, on stony path, under bushes);</p> <p><b>Finding out how</b> the conditions <b>affect</b> the number and type(s) of plants and animals that live there.</p>	
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Disciplinary knowledge - Being a Balderstone Scientist	
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	<p>I know how to make informed choices about what I put onto and into my body (PSHE links).</p> <p><b>Balderstone Scientists can</b></p> <p><b>Comparing and contrasting</b> the diets of different animals (including their pets). Decide ways of <b>grouping</b> them according to what they eat.</p> <p><b>Researching</b> different food groups and how they keep us healthy. Designing meals based (<b>Create / Invent/ Design</b>) on what they find out.</p>	<p>have adapted other ways to support themselves, move &amp; protect their vital organs. Know how the skeletons of birds, mammals, fish, amphibians or reptiles are similar (backbone, ribs, skull, bones used for movement) and the differences in their skeletons. Know that muscles, which are attached to the skeleton, help animals move parts of their body. Explore how humans grow bigger as they reach maturity by making comparisons linked to body proportions and skeleton growth - e.g. do people with longer legs have longer arm spans? Recognise that animals are alive; they move, feed, grow, use their senses and reproduce.</p>	<p>and explore questions that help them understand their special functions.</p> <p><b>Pupils might work scientifically by:</b> <b>Comparing</b> the teeth of carnivores and herbivores. <b>Suggesting reasons</b> for differences [<b>grouping &amp; classifying</b>]. <b>Finding out [testing and/or researching]</b> what damages teeth and how to look after them. <b>Drawing and discussing their ideas</b> about the digestive system. <b>Comparing</b> them with ... ... <b>models</b> or images.</p>	<p>Plants need nutrients to grow healthily (either naturally from the soil or from fertiliser added to soil).</p> <p>Pupils know the relationship between structure and function: the idea that every part has a job to do. I can explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.</p> <p><b>Balderstone (Fox) Scientists know how to:</b> <b>Comparing</b> the effect of different factors on plant growth, for example the amount of light, the amount of fertiliser; Discovering (<b>research and modelling</b>) how seeds are formed by <b>Observing</b> the different stages of plant cycles over a period of time; <b>Looking for patterns</b> in the structure of fruits that relate to how the seeds are dispersed. <b>Observing</b> how water is transported in plants, for example, by putting cut, white carnations into coloured water. <b>Observing</b> how water travels up the stem to the flowers.</p>
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		<p>Pupils know the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.</p> <p><b>Balderstone (Fox) scientists can:</b></p> <p><b>Identifying and grouping</b> animals with and without skeletons.</p> <p><b>Observing and comparing</b> their movement.</p> <p><b>Exploring</b> ideas about what would happen if humans did not have skeletons.</p>		
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	<p><b>Rocks and Soils.</b>  <b>matter</b></p>	<p><b>Materials and their properties</b></p>	<p><b>States of</b></p>
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Pupils know how to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.

I can describe in simple terms how fossils are formed when things that have lived are trapped within rock.

I recognise that soils are made from rocks and organic matter

I recognise that rocks and soils can feel and look different.

I know that rocks and soils can be different in different places/environments.

(Linked with work in geography LKS2 and UKS2), pupils explore different kinds of rocks and soils, including those in the local environment.

### Balderstone (Fox) scientists know how to:

**Observing** rocks, including those used in buildings and gravestones.

**Exploring** how and why they might have changed over time.

**Using (equipment)** a hand lens or microscope to help them.

**Identify and classify** rocks according to whether they have grains or crystals, and whether they have fossils in them.

**Research** and discuss the different kinds of living things whose fossils are found in sedimentary rock.

**Explore** how fossils are formed.

**Explore** different soils and ...

**Identify similarities and differences** between them and describe the composition of soil.

**Investigate** what happens when rocks are rubbed together (classify according to hardness) or what changes occur when they are in water.

**Raise and answer questions** about the way soils are formed.

Pupils should be taught to:

Compare and group materials together, according to whether they are solids, liquids or gases.

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).

Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Solids, liquids and gases can be identified by their observable properties.

Solids have a fixed size and shape (the size and shape can be changed but it remains the same after the action).

Liquids can pour and take the shape of the container in which they are put.

Liquids form a pool not a pile.

Solids in the form of powders can pour as if they were liquids but make a pile not a pool.

Gases fill the container in which they are put.

Gases escape from an unsealed container.

Gases can be made smaller by squeezing/pressure.

Liquids and gases can flow.

### Notes and Guidance (non-statutory):

Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.

**Note:** Teachers should avoid using materials where heating is associated with chemical change, e.g. through baking or burning.

### Pupils might work scientifically by:

**Grouping and classifying** a variety of different materials.




**Exploring** the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party).

**Researching** the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid.

**Observing and recording** evaporation over a period of time, such as a puddle in the playground or washing on a line.

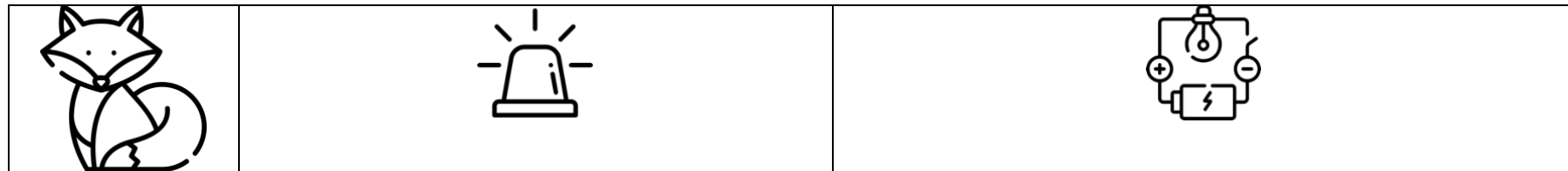


		<p><b>Investigating</b> the effect of temperature on washing drying or snowmen melting.          Additional suggestion from Lancashire for working scientifically opportunities which enhance learning and support using ICT.          This unit provides an ideal opportunity for <b>using data logging equipment</b> to detect/measure and compare temperatures.</p>
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	 <p style="text-align: center;"><b>Light and Astronomy - Light, reflections and shadows</b></p>	 <p style="text-align: center;"><b>Living things and their Habitats</b></p>
	<p>Pupils should be taught to:          Recognise that they need light in order to see things and that dark is the absence of light.  <u>Notice that light is reflected from surfaces.</u>          Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.  <u>Recognise that shadows are formed when the light from a light source is blocked by a solid object.</u>  <u>Find patterns in the way that the size of shadows can change.</u></p> <p><b>Notes and Guidance (non-statutory):</b>          Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them answer questions about how light behaves. They should think about why it is important to protect their eyes from bright lights. They should look for, and measure shadows and find out how they are formed and what might cause shadows to change.  <b>Note:</b> Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.</p> <p><b>Pupils might work scientifically by:</b></p>	<p>Pupils should be taught to:  <u>Recognise that living things can be grouped in a variety of ways.</u>  <u>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</u>  <u>Recognise that environments can change and that this can sometimes pose dangers to living things.</u>          Use and make identification keys for plants and animals.</p> <p><b>Notes and Guidance (non-statutory):</b>          Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year. Pupils should explore possible ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants, Pupils could begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.</p> <p><b>Note:</b> Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses.</p> <p>Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves,</p>



	<p><b>Looking for patterns</b> in what happens to shadows when the light source moves or the distance between the light source and the object changes.</p>	<p>ecologically planned parks or garden ponds, and the negative effects of population and development, litter or deforestation.</p> <p><b>Pupils might work scientifically by:</b></p> <ul style="list-style-type: none"> <li>• <b>Using and making simple guides or keys [grouping &amp; classifying]</b> to explore and identify local plants and animals.</li> <li>• <b>Making a guide [grouping &amp; classifying]</b> to local living things.</li> <li>• <b>Raising and answering questions</b> based on their <b>observations</b> of animals and</li> <li>• What they have found out about other animals that they have <b>researched</b>.</li> </ul>
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	Sound	Electricity
	<p>Pupils should be taught to:</p> <p><b>Vibrations</b>  <u>Identify how sounds are made, associating some of them with something vibrating.</u>  <u>Recognise that vibrations from sounds travel through a medium to the ear.</u>  <u>Find patterns between the volume of a sound and the strength of the vibrations that produced it.</u>  <u>Recognise that sounds get fainter as the distance from the sound source increases.</u>            Recognise that sounds can be made in a variety of ways (pluck, bang, shake, blow) using a variety of things (instruments, everyday materials, body).            Sounds travel away from their source in all directions.            Vibrations may not always be visible to the naked eye.</p> <p><b>Pitch</b>  <u>Find patterns between the pitch of a sound and features of the object that produced it.</u>            Sounds can be high or low pitched.            The pitch of a sound can be altered.            Pitch can be altered either by changing the material, tension, thickness or length of vibrating objects or changing the length of a vibrating air column.</p> <p><b>Muffling/blocking sounds</b>  <u>Recognise that vibrations from sounds travel through a medium to the ear.</u>            Sounds are heard when they enter our ears (although the structure of the ear is not important key learning at this age phase).            Sounds can travel through solids, liquids and air/gas by making the materials vibrate.            Sound travel can be reduced by changing the material that the vibrations travel through.            Sound travel can be blocked.</p>	<p>Pupils should be taught to:</p> <p>Identify common appliances that run on electricity.  <u>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</u>  <u>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.</u>  <u>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</u>  <u>Recognise some common conductors and insulators, and associate metals with being good conductors.</u>            Electricity can be dangerous.            Electricity sources can be mains or battery.            Batteries 'push' electricity round a circuit and can make bulbs, buzzers and motors work.            Faults in circuits can be found by methodically testing connections.            Drawings, photographs and diagrams can be used to represent circuits (although standard symbols need not be introduced until UKS2).</p> <p><b>Notes and Guidance (non-statutory):</b>            Pupils should construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in Year 6.  <b>Note:</b> Pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity.</p> <p><b>Pupils might work scientifically by:</b>  <b>Observing/noticing patterns</b>, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.</p>



	<p><b>Notes and Guidance (non-statutory):</b>  Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways.</p> <p><b>Pupils might work scientifically by:</b>  <b>Finding patterns</b> in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses.  They might make ear muffs from a variety of different materials <b>to investigate /test</b> which provides the best insulation against sound.  They could <b>make [create/invent/design]</b> and play their own instruments by <b>using what they have found out</b> about pitch and volume.</p> <p>Additional suggestion from Lancashire for working scientifically opportunities which enhance learning and support using ICT across the curriculum  This unit provides an ideal opportunity for <b>using data logging equipment</b> to detect/measure and compare sounds.</p>	
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Disciplinary knowledge - Being a Balderstone Scientist	
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Year 5 & 6



**Animals including Humans.**

Observing Life cycles.

Health - Exercise, Health & Circulatory system

Pupils should be taught to:  
Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.  
Describe the life process of reproduction in some plants and animals.

**Notes and Guidance (non-statutory):**

They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.

Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants and sexual reproduction in animals.

**Pupils might work scientifically by:**

**Asking pertinent questions.**

**Suggesting reasons for similarities and differences [grouping and classifying].**

Pupils should be taught to:  
Describe the changes as humans develop to old age.

Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire and excrete.

**Notes and Guidance (non-statutory):**

Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty.

**Pupils might work scientifically by:**

**Researching** the gestation periods other animals and **comparing** them with humans.

By **finding out** and **recording** the length and mass of a baby as it grows.

Pupils should be taught to:  
Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.  
Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (in the long term and short term).  
Describe the ways in which nutrients and water are transported within animals, including humans.

The heart is a major organ and is made of muscle.

The heart pumps blood around the body through vessels and this can be felt as a pulse.

The heart pumps blood through the lungs in order to obtain a supply of oxygen.

Blood carries oxygen/essential materials to different parts of the body. During exercise muscles need more oxygen so the heart beats faster and our breathing and pulse rates increase.

Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire and excrete.

An adequate, varied and balanced diet is needed to help us grow and repair our bodies (proteins), provide us with energy (fats and carbohydrates) and maintain good health (vitamins and minerals).

Tobacco, alcohol and other 'drugs' can be harmful.

All medicines are drugs, not all drugs are medicines.



**Notes and Guidance (non-statutory):**

Pupils should build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function. Pupils should learn how to keep their bodies healthy and how their bodies might be damaged - including how some drugs and other substances can be harmful to the human body.





	<p><b>Observe changes</b> in an animal <b>over a period of time</b> (e.g. by hatching and rearing chicks).  <b>Comparing</b> how different animals reproduce and grow.</p>		<p><b>Pupils might work scientifically by:</b>  <b>Exploring the work of scientists</b> and Scientific <b>research</b> about the relationship between diet, exercise, drugs, lifestyle and health.          *Additional suggestion beyond NC2014 to support pupils working scientifically and to provide an opportunity to use ICT to collect/interpret data  <b>Observing/Measuring changes</b> to breathing, heart beat and or pulse rates after exercise.</p>
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	 Plants
	<p><u>Describe the life process of reproduction in some plants</u></p>



	<p>Name, locate and describe the functions of the main parts of reproductive system of plants (stigma, stamen, petal, sepal, pollen, ovary)</p> <p>Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example plants in the vegetable garden or flower border, and animals in the local environment.</p> <p><b>Observing</b> and <b>comparing</b> the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times).</p> <p>They might <b>try to [explore]</b> grow new plants from different parts of the parent plant, for e.g., seeds, stem and root cuttings, tubers, bulbs.</p>
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	<div style="text-align: center;"> <p><b>Materials and their properties</b></p> </div>		
	<p><b>Testing material properties.</b></p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>Compare and group together everyday materials on the basis of their properties, including their hardness,</li> </ul>	<p><b>Reversible changes.</b></p> <ul style="list-style-type: none"> <li>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</li> </ul>	<p><b>Irreversible changes</b></p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with</li> </ul>



<p><u>solubility, transparency, conductivity (electrical and thermal), and response to magnets.</u></p> <ul style="list-style-type: none"> <li>▪ <u>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic (advantages and disadvantages).</u> <ul style="list-style-type: none"> <li>▫ Compare a variety of materials and measure their effectiveness (e.g. hardness, strength, flexibility, solubility, transparency, thermal conductivity, electrical conductivity).</li> </ul> </li> </ul> <p>Temperature and Thermal Insulation</p> <ul style="list-style-type: none"> <li>▫ Heat always moves from hot to cold.</li> <li>▫ Some materials (insulators) are better at slowing down the movement of heat than others.</li> <li>▫ Objects/liquids will warm up or cool down until they reach the temperature of their surroundings.</li> </ul> <p><b>Notes and Guidance (non-statutory):</b> Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials and relating these to what they learnt about magnetism in Year 3 and about electricity in Year 4.</p> <p><b>Note:</b> Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter</p>	<ul style="list-style-type: none"> <li>▪ <u>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</u></li> <li>▪ <u>Demonstrate that dissolving, mixing and changes of state are reversible changes.</u> <ul style="list-style-type: none"> <li>▫ Changes can occur when different materials are mixed.</li> <li>▫ Some material changes can be reversed and some cannot.</li> <li>▫ Recognise that dissolving is a reversible change and <u>recognise everyday situations where dissolving occurs.</u></li> <li>▫ Distinguish between melting and dissolving.</li> <li>▫ Mixtures of solids (of different particle size) can be separated by sieving.</li> <li>▫ Mixtures of solids and liquids can be separated by filtering if the solid is insoluble (un-dissolved).</li> <li>▫ Evaporation helps us separate soluble materials from water.</li> <li>▫ Changes to materials can happen at different rates (factors affecting dissolving, factors affecting evaporation - amount of liquid, temperature, wind speed, etc).</li> <li>▫ Freezing, melting and boiling changes can be reversed (revision from YR4).</li> </ul> </li> </ul> <p><b>Notes and Guidance (non-statutory):</b> Pupils should explore reversible changes including evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes.</p>	<p>burning, and the action of acid on bicarbonate of soda (producing a gas / fizzing).</p> <p><b>Notes and Guidance (non-statutory):</b> Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.</p> <p><b>Note:</b> Safety guidelines should be followed when burning materials.</p> <p><b>Pupils might work scientifically by:</b></p> <ul style="list-style-type: none"> <li>• <b>Observing</b> and <b>comparing</b> the changes that take place, for example, when burning different materials or baking bread or cakes.</li> <li>• <b>Researching</b> and <b>discussing</b> how chemical changes have an impact on our lives, for example cooking.</li> <li>• <b>Discuss [research]</b> the creative use of new materials such as polymers, super-sticky and super-thin materials.</li> </ul> <p><u><b>Explain</b> how they know when a change is reversible or irreversible</u></p>
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	<p>than others when a heat source is placed against them.</p> <p><b>Pupils might work scientifically by:</b></p> <ul style="list-style-type: none"> <li>• <b>Carry out tests</b> to answer questions such as 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?'</li> </ul> <p><b>Compare</b> materials in order to make a switch in a circuit.</p>		
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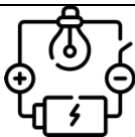
	 <p><b>Light and Astronomy</b> <b>Earth in Space</b></p>	 <p><b>Living Things and their Habitats</b></p> <p>Classification</p> <p>Evolution and Inheritance</p>	
	<p>Pupils should be taught to:</p> <p><u>Describe the movement of the Earth, and other planets, relative to the Sun and each other in the solar system.</u></p> <p><u>Describe the movement of the Moon relative to the Earth.</u></p> <p>Describe Sun/Earth/Moon as approximately spherical bodies.</p> <p><u>Use the idea of the Earth's rotation to explain day and night.</u></p> <p>The Earth spins once around its own axis in 24 hours, giving day and night.</p> <p>The Earth orbits the Sun in one year.</p> <p>We can see the Moon because the Sun's light reflects off it.</p>	<p>Pupils should be taught to:</p> <p><u>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.</u></p> <p>Give reasons for classifying plants and animals based on specific characteristics.</p> <p>Living things can be grouped into micro-organisms, plants and animals.</p>	<p>Pupils should be taught to:</p> <p><u>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</u></p> <p><u>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</u></p> <p><u>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</u></p> <p><b>Notes and Guidance (non-statutory):</b></p> <p>Building on what they have learnt about fossils in the topic on rocks in Year 3, pupils should find out more about how living things on earth have changed over time. They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different</p>



	<p>The Moon orbits the Earth in approximately 28 days and changes to the appearance of the moon are evidence of this.  <u>Use the Earth's movement in space to explain the apparent movement of the sun across the sky.</u>          The Sun appears to move across the sky from East to West and this causes shadows to change during the day.          Changes to shadow length over a day or changes to sunrise and sunset times over a year are evidence supporting the movement of the Earth.</p> <p><b>Notes and Guidance (non-statutory):</b>          Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night. Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).</p> <p><b>Note:</b> Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.</p> <p><b>Pupils might work scientifically by:</b></p>	<p>Vertebrates can be grouped as fish, amphibians, reptiles, birds and mammals.          Invertebrates can be grouped as snails and slugs, worms, spiders and insects.          Plants can be grouped as flowering plants (incl. trees and grasses) and non-flowering plants (such as ferns and mosses).</p> <p><b>Notes and Guidance (non-statutory):</b>          Pupils should build on their learning about grouping living things in Year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (e.g. insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another. Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.</p> <p><b>Pupils might work scientifically by:</b>  <u>Using classification systems and keys.</u></p>	<p>breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.</p> <p><b>Note:</b> At this stage, pupils are not expected to understand how genes and chromosomes work.</p> <p><b>Pupils might work scientifically by:</b>  <b>Observing</b> and <b>raising questions</b> about local animals and how they are adapted to the environment.  <b>Comparing</b> how some living things adapt to survive in extreme conditions, e.g. cactuses, penguins and camels.  <b>Analysing the advantages and disadvantages</b> of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.</p>
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	<p><b>Comparing</b> the time of day at different places on the Earth through internet links and direct communication.</p> <p><b>Creating simple models</b> of the solar system.</p> <p><b>Constructing</b> simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day.</p> <p><b>Finding out</b> why some people think that structures such as Stonehenge might have been used as astronomical clocks.</p>	<p><b>Identifying [grouping and classifying]</b> some animals and plants in the immediate environment.</p> <p><b>Researching</b> unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system [<b>grouping and classifying</b>].</p>	
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	 <p><b>Forces</b></p>	 <p><b>Light and Astronomy - How light travels</b></p>	 <p><b>Electricity</b></p>
	<p>Pupils should be taught to:</p> <p><u>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</u></p> <p><u>Identify the effects of air resistance, water resistance and friction that act between moving surfaces</u> (causing things to slow down)</p> <p><u>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</u></p> <p><u>There are different types of forces</u> (push, pull, friction, air resistance, water resistance, magnetic forces, gravity) <u>which have different effects on objects</u></p>	<p>Pupils should be taught to:</p> <p><u>Recognise that light appears to travel in straight lines.</u></p> <p><u>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.</u></p> <p><u>Explain that we see things because the light that travels from light sources to our eyes or from light sources to objects and then to our eyes (and represent this in simple diagrammatic form).</u></p> <p><u>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</u></p> <p><b>Notes and Guidance (non-statutory):</b></p>	<p>Pupils should be taught to:</p> <p><u>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</u></p> <p><u>Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</u></p> <p><u>Use recognised symbols (at least: cells, wires, switches, bulbs, buzzers and motors) when representing a simple circuit in a diagram.</u></p> <p><u>Use/interpret circuit diagrams</u> to construct a variety of more complex circuits predicting whether they will 'work'.</p> <p><b>Notes and Guidance (non-statutory):</b></p>






	<p><u>Gravity can act without direct contact between the Earth and an object.</u> Friction, air resistance and water resistance can be useful or unwanted. The effects of friction, air resistance and water resistance can be reduced or increased for a preferred effect. More than one force can act on an object simultaneously (either reinforcing or opposing each other).</p> <p><b>Notes and Guidance (non-statutory):</b> Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down. Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.</p> <p><b>Pupils might work scientifically by:</b> <b>Exploring</b> falling paper cones or cup-cake cases. <b>Designing and making [exploring]</b> a variety of parachutes. <b>Carrying out fair tests</b> to determine which designs are the most effective.</p>	<p>Pupils should build on the work in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.</p> <p><b>Pupils might work scientifically by:</b> Deciding [<b>observe/explore</b>] where to place rear-view mirrors on cars. <b>Designing and making [Create / Invent / Design]</b> a periscope and using the idea that light appears to travel in straight lines to explain how it works. <b>Investigating</b> the relationship [<b>looking for patterns</b>] between light sources, objects and shadows by using shadow puppets. Extend their experience [<b>explore and observe</b>] of light by looking at a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).</p>	<p>Building on their work in Year 4, pupils should construct simple series circuits, to help them answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols.</p> <p><b>Note:</b> Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity.</p> <p><b>Pupils might work scientifically by:</b></p> <ul style="list-style-type: none"> <li>• Systematically identifying [<b>testing</b>] the effect of changing one [thing] component at a time in a circuit.</li> </ul> <p><b>Designing and making [Create / Invent / Design]</b> a set of traffic lights, a burglar alarm or some other useful circuit.</p>
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## Science - Knowledge Learning and Skill Progression



	<p><b>Exploring</b> resistance in water by making and testing boats of different shapes.</p> <p><b>Design and make</b> [create/invent/design] artefacts that use simple levers, pulleys, gears and/or springs and explore their effects.</p>		
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	<p>Substantive knowledge</p>
	<p>Animals including humans</p>







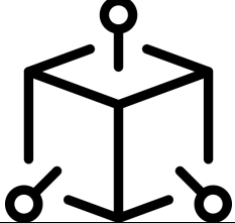

	<p>Living things and their habitats</p>
	<p>Plants</p>
	<p>Materials</p>
	<p>Rocks</p>
	<p>Forces</p>
	<p>Electricity</p>
	<p>Sound</p>
	<p>Light and Astronomy</p>



	<p>Evolution and Inheritance</p>
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	<p>Being a Balderstone Scientist (disciplinary knowledge)</p>
	<p>Planning and Testing</p>
	<p>Using equipment &amp; measures</p>
	<p>Communicating</p>
	<p>Considering results</p>
	<p>Exploring/observing</p>
	<p>Grouping and Classifying</p>



	Questioning
	Research
	Modelling
	Collaborating