

**Archbishop Hutton's
Primary School**



Upper Key Stage 2 WORKING SCIENTIFICALLY

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- 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
- identifying scientific evidence that has been used to support or refute ideas or arguments

NATIONAL CURRICULUM PROGRAMES OF STUDY

Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; 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. They should use and develop 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. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time. These opportunities for working scientifically should be provided across years 5 and 6 so that the expectations in the programme of study can be met by the end of year 6. Pupils are not expected to cover each aspect for every area of study.

Prior knowledge: KS1/LKS2

Animals Including humans

To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene Y2.

To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene Y3

To describe the simple functions of the basic parts of the digestive system in humans Y4.

To identify the different types of teeth in humans and their simple functions Y4.

Year Group Expectations: Year 5/6

Animals Including humans

Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood Y6.

Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function Y6.

Describe the ways in which nutrients and water are transported within animals, including humans Y6.

The heart is a major organ and is made of muscle Y6.

The heart pumps blood around the body through vessels and this can be felt as a pulse Y6.

The heart pumps blood through the lungs in order to obtain a supply of oxygen Y6.

Blood carries oxygen/essential materials to different parts of the body Y6.

During exercise muscles need more oxygen so the heart beats faster and our

NC UKS2 expectations: KS3

Animals Including humans

- The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases
- The effects of recreational drugs (including substance misuse) on behaviour, health and life processes.
- The structure and functions of the gas exchange system in humans, including adaptations to function
- The mechanism of breathing to move air in and out of the lungs
- The impact of exercise, asthma and smoking on the human gas exchange system.

Forces

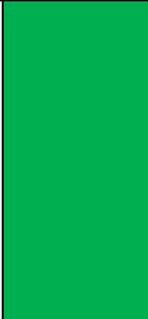
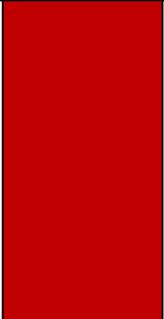
- To compare how things move on different surfaces Y3.
- To notice that some forces need contact between two objects, but magnetic forces can act at a distance Y3.

Forces

- To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object Y5.
- To identify the effects of air resistance, water resistance and friction, that act between moving surfaces Y5.

Physics

- Forces as pushes or pulls, arising from the interaction between two objects
- Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces
- Moment as the turning effect of a force
- Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water

<ul style="list-style-type: none"> To observe how magnets attract or repel each other and attract some materials and not others Y3. To compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials Y3. To describe magnets as having two poles Y3. To predict whether two magnets will attract or repel each other, depending on which poles are facing Y3. 	<ul style="list-style-type: none"> To recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect Y5. 	<ul style="list-style-type: none"> Forces measured in newtons, measurements of stretch or compression as force is changed 			
<ul style="list-style-type: none"> Everyday Materials To distinguish between an object and the material from which it is made Y1. To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock Y1. To describe the simple physical properties of a variety of everyday materials Y1. To compare and group together a variety of everyday materials on the basis of their simple physical properties Y1. To identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses Y2. To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching Y2. To compare and group materials together, according to whether they are solids, liquids or gases Y4. To 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 Y4). To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature Y4. 	<p>Everyday Materials</p> <ul style="list-style-type: none"> To compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets Y5. To know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution Y5. To use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating Y5. To give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic Y5. To demonstrate that dissolving, mixing and changes of state are reversible changes Y5. To explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda Y5. 	<p>Chemistry</p> <ul style="list-style-type: none"> Chemical reactions as the rearrangement of atoms Representing chemical reactions using formulae and using equations Combustion, thermal decomposition, oxidation and displacement reactions Defining acids and alkalis in terms of neutralisation reactions The pH scale for measuring acidity/alkalinity; and indicators 			
<p>SCIENCE</p>	<p>Theme: My Brilliant Body My Body Engine</p>	<p>SCIENCE</p>	<p>Theme: The Scientist Lab Speeding up and slowing down</p>	<p>SCIENCE</p>	<p>Theme: A Material World Burning and melting</p>
					

	<p>Key Knowledge:</p> <ul style="list-style-type: none"> The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system. Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins 	<p>Key Knowledge:</p> <ul style="list-style-type: none"> A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall. Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water or the air and water may be moving over a stationary object. A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines. 	<p>Key Knowledge:</p> <ul style="list-style-type: none"> Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. Mixtures can be separated by filtering, sieving and evaporation. Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.
	<p>Procedural Knowledge</p> <ul style="list-style-type: none"> Create a role play model for the circulatory system. Carry out a range of pulse rate investigations. Fair test – effect of different activities on my pulse rate Pattern seeking – exploring which groups of people may have higher or lower resting pulse rates. Observation over time - how long does it take my pulse rate to return to my resting pulse rate (recovery rate). Pattern seeking – exploring recovery rate for different groups of people. 	<p>Procedural Knowledge</p> <ul style="list-style-type: none"> Investigate the effect of friction in a range of contexts e.g. trainers, bath mats, mats for a helter-skelter Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water, pulling shapes e.g. boats along the surface of water Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats Explore how levers, pulleys and gears work Make a product that involves a lever, pulley or gear Create a timer that uses gravity to move a ball 	<p>Procedural Knowledge</p> <ul style="list-style-type: none"> Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate Investigate rates of dissolving by carrying out comparative and fair test Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning

	<ul style="list-style-type: none"> Learn about the impact of exercise, diet, drugs and lifestyle on the body. 		<ul style="list-style-type: none"> Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation 		<ul style="list-style-type: none"> Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced? Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton)
	<p>Key Vocabulary: Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle, aorta, arteries, capillaries, deoxygenated, organ, oxygen, oxygenated, pulse, veins, vena cava, ventricle</p>		<p>Key Vocabulary: Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears</p>		<p>Key Vocabulary: Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material</p>
	<p>Assessment: Can draw a diagram of the circulatory system and label the parts and annotate it to show what the parts do. Produces a piece of writing that demonstrates the key knowledge e.g. explanation text, job description of the heart. Use the role play model to explain the main parts of the circulatory system and their role Can use subject knowledge about the heart whilst writing conclusions for investigations. Can explain both the positive and negative effects of diet, exercise, drugs and lifestyle on the body. Present information e.g. in a health leaflet describing impact of drugs and lifestyle on the body.</p>		<p>Assessment: Can demonstrate the effect of gravity acting on an unsupported object. Can give examples of friction, water resistance and air resistance. Can give examples of when it is beneficial to have high or low friction, water resistance and air resistance. Can demonstrate how pulleys, levers and gears work. Can explain the results of their investigations in terms of the force, showing a good understanding that as the object tries to move through the water or air or across the surface, the particles in the water, air or on the surface slow it down. Can demonstrate clearly the effects of using levers, pulleys and gears.</p>		<p>Assessment: Can use understanding of properties to explain everyday uses of materials. For example, how bricks, wood, glass and metals are used in buildings. Can explain what dissolving means, giving examples. Can name equipment used for filtering and sieving. Can use knowledge of liquids, gases and solids to suggest how materials can be recovered from solutions or mixtures by evaporation, filtering or sieving. Can describe some simple reversible and non-reversible changes to materials, giving examples. Can create a chart or table grouping/comparing everyday materials by different properties. Can use test evidence gathered about different properties to suggest an appropriate material for a particular purpose. Can group solids based on their observations when mixing them with water. Can give reasons for choice of equipment and methods to separate a given solution or mixture such as salt or sand in water. Can explain the results from their investigations involving dissolving and non-reversible change.</p>