

Support

Generic science skills

P4	P5	P6	P7	P8	Early Years
<ul style="list-style-type: none"> • Explore objects and materials provided, changing some materials by physical means and observing the outcomes. • Communicate awareness of changes in light, sound or movement. • Imitate actions involving main body parts. • Make sounds using their own bodies, and imitate or copy sounds. 	<ul style="list-style-type: none"> • Take part in activities focused on the anticipation of and enquiry into specific environments. • Match objects and materials with single features or properties. • Indicate the before and after of material changes. • Try out a range of equipment in familiar and relevant situations. 	<ul style="list-style-type: none"> • Recognise distinctive features of objects. • Begin to make generalisations, connections and predictions from regular experience. • Sort materials according to a single criterion when the contrast is obvious. • Observe closely changes that occur. • Identify some appliances that use electricity. • Show knowledge of some sources of sound and light. 	<ul style="list-style-type: none"> • Understand the scientific use of some simple vocabulary, such as before, after, bumpy, grow, eat and move, and communicate related ideas and observations using simple phrases. • Demonstrate simple properties of light, sound and movement. • Make simple records of findings. 	<ul style="list-style-type: none"> • Observe patterns or regular changes in features of objects, living things and events. • Make some contribution to planning and evaluation and to recording findings. • Identify a range of common materials and know about some of their properties. • Sort materials using simple criteria and communicate observations of materials in terms of these properties. • Make observations of changes of light, sound or 	<ul style="list-style-type: none"> • Know about similarities in relation to places, objects, materials and living things. • Make observations of animals and plants and explain why some things occur. • Talk about changes.

<ul style="list-style-type: none"> • Cause intentional movement by a pushing or pulling action. 			<ul style="list-style-type: none"> • Begin to make suggestions for planning and evaluating work. 	<p>movement that result from actions and describe the changes when questioned.</p>	
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Challenge

Years 7, 8 and 9 - Working scientifically

Experimental skills and investigations	Handling information and problem solving	Scientific attitudes	Measurement
<ul style="list-style-type: none"> • Ask questions and develop lines of enquiry based on observations. • Make predictions using scientific knowledge and understanding. • Plan and design investigations and experiments to make observations and test predictions. • Identify independent, dependent and control variables and other factors to be taken into account when collecting evidence and data. • Select appropriate techniques, apparatus, and materials during fieldwork and laboratory work, working safely. • Make and record observations and measurements using a range 	<ul style="list-style-type: none"> • Present observations and data using appropriate methods, including tables and graphs. • Interpret observations and data. • Present reasoned explanations. • Evaluate data, showing awareness of potential errors. • Identify questions arising from results of investigations. 	<ul style="list-style-type: none"> • Work objectively with concern for validity. • Understand the need for collaborative research and peer review. • Evaluate risks. 	<ul style="list-style-type: none"> • Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature. • Use and derive simple equations. • Undertake data analysis.

<p>of methods for different investigations.</p> <ul style="list-style-type: none">• Evaluate the reliability of methods and suggest possible improvements.			
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Years 7, 8 and 9 - Biology

<p>Structure and function of living organisms</p> <p>Cells and organisation</p> <ul style="list-style-type: none"> • The purpose and structure of cells. • The function of parts of a cell. • Movement of materials in and between cells. • The organisation of multicellular organisms. <p>The skeletal and muscular systems</p> <ul style="list-style-type: none"> • The structure and functions of the human skeleton. • The interaction between skeleton and muscles. • The function and actions of major muscle 	<p>Energy flow and material cycles</p> <p>Photosynthesis</p> <ul style="list-style-type: none"> • The dependence of almost all life on Earth on the transfer of solar energy. • The relationship between the structures and functions of leaves. • The word equation for photosynthesis. • Mineral nutrition in plants. • Chemosynthesis in bacteria and other organisms. <p>Cellular respiration</p> <ul style="list-style-type: none"> • Aerobic and anaerobic respiration in living organisms. • The word equation for aerobic respiration. • The process of anaerobic 	<p>Interactions and interdependencies</p> <p>Relationships in an ecosystem</p> <ul style="list-style-type: none"> • The interdependence of organisms. • How organisms affect, and are affected by, their environment. • The role of variation in enabling closely related living things to survive in the same ecosystem. 	<p>Genetics and evolution</p> <p>Reproduction</p> <ul style="list-style-type: none"> • Reproduction organs and processes in humans. • Reproduction in plants. • Insect pollination in human food security. <p>Inheritance, chromosomes, DNA and genes</p> <ul style="list-style-type: none"> • Heredity. • The development of the DNA model. • Variation between individuals of difference species. • Variation between individuals within a species. • Variation leading to competition which can drive adaptation. • Changes in the environment that
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<p>groups.</p> <p>Human nutrition and digestion</p> <ul style="list-style-type: none"> • Content in a healthy human diet. • Food tests for starch, simple sugars, protein and fat. • Calculations of energy requirements in a healthy daily diet. • The consequences of imbalances in the diet. • The tissues and organs of the digestive system. • The importance of bacteria in the digestive system. <p>The breathing (gas exchange) system</p> <ul style="list-style-type: none"> • The structure and functions of the gas 	<p>respiration in humans and micro-organisms, including the word equation for anaerobic respiration.</p> <ul style="list-style-type: none"> • The differences between aerobic and anaerobic respiration. 		<p>leave some species less well adapted to compete successfully and reproduce.</p> <ul style="list-style-type: none"> • The use of gene banks to preserve hereditary material.
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<p>exchange system in humans.</p> <ul style="list-style-type: none"> • The mechanism of breathing. • The impact of exercise, asthma and smoking on the breathing system. <p>Health</p> <ul style="list-style-type: none"> • The effects of drugs (including as medicines as well as substances misuse) on behaviours. 			
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Years 7, 8 and 9 - Chemistry

Pure and impure substances	The particulate nature of matter	Chemical reactions	Energetics	The Periodic Table	Materials	Earth science
<ul style="list-style-type: none"> • Mixtures, including dissolving. • Techniques for separating mixtures: chromatography, filtering, evaporation and distillation. • The identification of pure substances. 	<ul style="list-style-type: none"> • The properties of the different states of matter. • Changes of state in terms of particle kinetics and energy changes. • The nature of atoms, elements and compounds. • Conservation of mass in chemical and physical change. 	<ul style="list-style-type: none"> • Chemical reactions as the rearrangement of atoms. • Representing chemical reactions using formulae and using equations. • Combustion. 	<ul style="list-style-type: none"> • Chemical reactions. • Acids, alkalis and neutralisation. • Defining acids, bases and alkalis. • The pH scale for measuring acidity/alkalinity. • Reactions of acids with bases and metals. 	<ul style="list-style-type: none"> • The Periodic Table: periods and groups; metals and non-metals. • How patterns in reactions can be explained and predicted with reference to the Periodic Table. • The varying physical and chemical properties of different elements. • The chemical properties of metals and non-metals. 	<ul style="list-style-type: none"> • The order of metals and carbon in the reactivity series. • The use of carbon in obtaining metals from metal oxides. • Ceramics, polymers and composites. 	<ul style="list-style-type: none"> • The composition of the Earth and the atmosphere. • Changes to the Earth's atmosphere since its formation. • The production of carbon dioxide by human activity and the impact on climate and the efficacy of recycling.

Years 7, 8 and 9 - Physics

Energy	Motion and forces	Waves	Electricity and electromagnetism	Matter
<p>Changes and transfers</p> <ul style="list-style-type: none"> Processes that cause change, with forces, with matter and with electricity. Calculations comparing ratings of appliances in kilowatts (kW) and amounts of energy from different foods. Fuel, fuel sources and heating. <p>Auditing change</p> <ul style="list-style-type: none"> Audit calculation using measures of change in energy. Rates of change measured in 	<p>Describing motion</p> <ul style="list-style-type: none"> Speed and the relationship between average speed, distance and time (speed = distance ÷ time). The representation of a journey on a distance-time graph. Relative motion. <p>Forces</p> <ul style="list-style-type: none"> Forces arising from the interaction between two objects. Moments. Measurement of forces in Newtons. Hooke's Law. 	<p>Observed waves</p> <ul style="list-style-type: none"> Waves on water. <p>Sounds waves</p> <ul style="list-style-type: none"> Frequencies of sound waves. The speed of sound in air. Sound produced by vibrations of objects. Auditory range. <p>Energy and waves</p> <ul style="list-style-type: none"> Sound waves carrying energy. <p>Light waves</p> <ul style="list-style-type: none"> The similarities and differences between light and waves. 	<p>Current electricity</p> <ul style="list-style-type: none"> Electric current. Current as flow of charge. Potential difference and resistance. Differences in resistance between conducting and insulating components. <p>Static electricity</p> <ul style="list-style-type: none"> Separation of positive or negative charges when objects are rubbed together. The idea of electric field forces acting across the space between 	<p>Physical changes</p> <ul style="list-style-type: none"> Conservation of material and of mass. Similarities and differences between solids, liquids and gases. Brownian motion in gases. Diffusion in liquids and gases. The difference between chemical and physical changes. <p>Particle model</p> <ul style="list-style-type: none"> The differences in arrangements, in motion and in closeness of particles, explaining changes of state, shape and density.

<p>kW.</p>	<ul style="list-style-type: none"> • Gravity forces acting at a distance on Earth and in space. <p>Pressure forces</p> <ul style="list-style-type: none"> • Atmospheric pressure. • Pressure in liquids, including upthrust effects, floating and sinking. • Pressure measured by ratio of force over area - acting in all directions. <p>Balanced forces</p> <ul style="list-style-type: none"> • Opposing forces and equilibrium. <p>Forces and motion</p> <ul style="list-style-type: none"> • The role of forces in causing motion or changes in motion. 	<ul style="list-style-type: none"> • Light waves travelling through a vacuum and the speed of light. • The transmission of light through materials. • The refraction of light and the human eye. • Light transferring energy. • Colour and the different frequencies of light. 	<p>objects not in contact.</p> <p>Magnetism</p> <ul style="list-style-type: none"> • Magnetic poles, attraction and repulsion. • Magnetic fields. • The magnetic effect of a current, electromagnets, D.C. motors. 	<ul style="list-style-type: none"> • Atoms and molecules as particles. <p>Energy in matter</p> <ul style="list-style-type: none"> • Changes of temperature in motion and spacing of particles. • Internal energy stored in materials.
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