



Year 7 Science

Age Related Expectations

All children are assessed against the Age Related Expectations (ARE) within the different curriculum subjects. The ARE's are taken from the National Curriculum but are consolidated to reflect what we expect of a child. For example, three or four national curriculum targets might be summarised in one ARE. Judgements are generally based on a variety of different sources but will generally be a combination of on-going formative assessment in class, book work and formal summative testing.

The curriculum for science aims to ensure that all pupils: develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics; develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.

	Key Performance Indicators	Age Related Expectations
Working scientifically Science attitudes	<ul style="list-style-type: none"> - Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility - Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review. 	<p>A child should use and compare the information from the selection of resources given to complete the set research task. They identify and select the key data from at least one source.</p> <p>They should use recognise the value of models to explain ideas.</p>
Working scientifically Experimental skills and investigations	<ul style="list-style-type: none"> - Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience - Apply sampling techniques. - Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety - Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements - Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate - Make predictions using scientific knowledge and understanding 	<p>A child should construct a scientific question for an investigation where the variables are known. Eg How does changing the size of beaker affect the length of time a candle burns?</p> <p>During an investigation the child should describe the action required to control a known risk.</p> <p>They should select the appropriate equipment to use from a range offered and describe and record observations and evidence systematically.</p> <p>They should recognise a range of variables involved in the investigation and decide how to control them.</p> <p>They should describe the expected outcome of the investigation with reasons for their ideas.</p>
Working scientifically Measurements	<ul style="list-style-type: none"> - Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature - Undertake basic data analysis including simple statistical techniques. - Use and derive simple equations and carry out appropriate calculations 	<p>A child should make decisions as to what to measure or observe in order to answer a question.</p> <p>They should use common units of measurement and be able to compare and order the data.</p> <p>They should calculate speed and complete word equations of chemical reactions and for respiration.</p>
Working scientifically Analysis and evaluation	<ul style="list-style-type: none"> - Apply mathematical concepts and calculate results - Identify further questions arising from their results. - Present observations and data using appropriate methods, including tables and graphs - Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions - Present reasoned explanations, including explaining data in relation to predictions and hypotheses 	<p>A child should describe any patterns in their results and refer to the results as evidence for their ideas.</p> <p>They should identify and give reasons for any data that doesn't fit the patterns.</p> <p>A child will use some technical terminology and specialist vocabulary.</p> <p>They may suggest a similar idea that could be investigated.</p>
Biology Structure and function of organisms Cells	<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>A child should identify and compare features of plant and animal cells, describing how some cells are adapted for their function. They should describe how substances move in and out of cells eg water in the root hair cell and gaseous exchange.</p> <p>They should observe cells using a microscope.</p> <p>They should describe how cells, tissues and organs function to support the 7 life processes, including growth by cell division and unicellular organisms.</p>



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Biology Structure and function of organisms Nutrition and digestion	<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>A child should use a model to describe how large food molecules are broken down during digestion and describe the role of blood in transporting products of digestion around the body. They should describe the role of the main nutrients in the body and identify and compare the nutrient and energy values of a variety of food.</p> <p>They should describe the health problems caused by deficiency of nutrients eg Obesity starvation disease scurvy.</p>
Biology Structure and function of organisms Gas exchange	<ul style="list-style-type: none"> - The structure and functions of the gas exchange system in humans. - The mechanism of breathing. - The impact of exercise, asthma and smoking on gas exchange - The effects of drugs and substance misuse 	<p>A child should label the parts and their functions, required to get oxygen into and carbon dioxide out of the body.</p> <p>They should describe the steps for the mechanism of breathing, including how oxygen is diffused into the blood and the differences between inhaled and exhaled air. They should describe how asthma and smoking can reduce the amount of oxygen getting into the blood.</p> <p>They should analyse data from investigations to describe how exercise affects breathing rate giving reasons. They should describe how asthma and smoking can reduce the amount of oxygen getting into the blood.</p>
Biology Structure and function of organisms Reproduction	<ul style="list-style-type: none"> - The structure and function of the reproductive organs - Menstrual cycle(without details of hormones) - Growth of the embryo - Role of the placenta 	<p>A child will name the main reproductive organs and describe their functions. They should explain how egg and sperm cells are specialised and describe fertilisation as the fusion of two cell nuclei, using scientific terms gametes DNA chromosomes.</p> <p>They should describe the changes of the menstrual cycle, eg egg maturation, ovulation, and menstruation and calculate dates for ovulation, egg release, menstruation for a regular cycle.</p> <p>A child should describe how harmful substances and viruses can cross the placenta into the foetus and affect development.</p> <p>They should describe differences between the gestation periods and the independence of the young of humans and other mammals</p>
Biology Respiration	<ul style="list-style-type: none"> - To understand the process of Aerobic respiration - To interpret the word summary for aerobic respiration - To understand the process of anaerobic respiration in humans and micro-organisms, including the word equation for anaerobic respiration. - The analyse differences between aerobic and anaerobic respiration. 	<p>A child should explain the process of aerobic respiration in plants and animals and how aerobic respiration is similar to the burning of fuels.</p> <p>A child should represent the process of respiration as a word equation and identify the reactant and product.</p> <p>They should compare anaerobic and aerobic respiration with examples, explaining the effects of anaerobic respiration on humans exercising.</p>
Chemistry The nature of matter	<ul style="list-style-type: none"> - To know the properties of the different states of matter (solid, liquid and gas) in terms of the particle model. including gas pressure - To understand changes of state in terms of the particle model. - To understand energy changes on changes of state (qualitative) - To understand conservation of mass in changes of state and chemical reactions. 	<p>A child should compare the properties of solids liquid gases and relate this to the arrangement of particles.</p> <p>They should describe how change in temperature may slow down particles or speed up particles and how speed affects their arrangement, the state of matter and pressure in gas.</p> <p>They should list the characteristics of a physical and chemical reaction with examples.</p>
Chemistry To understand and compare pure and impure substances	<ul style="list-style-type: none"> - To investigate mixtures, including dissolving - To describe diffusion in terms of the particle model - To use simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography. 	<p>A child will select and describe the most appropriate method for separating mixtures explain why in terms of particle behaviour and arrangement.</p> <p>They will use a model of particle arrangement and behaviour to describe diffusion and solutions.</p>



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Chemistry Reactions	<ul style="list-style-type: none"> - To represent chemical reactions using formulae and equations - To explain combustion and oxidation. - To explain exothermic and endothermic chemical reactions. 	<p>A child will know the fire triangle.</p> <p>They will describe how the size of a container can affect how long a candle will burn.</p> <p>They will describe patterns in simple reactions identifying the reactants and products, using this to predict the outcome of other reactions. eg metals and carbonates in acid.</p> <p>They will describe how to test for oxygen, hydrogen and carbon dioxide gas. They will complete word equations for simple reactions. Eg copper+ oxygen -> copper oxide.</p>
Chemistry Acids and Alkalis	<ul style="list-style-type: none"> - To define acids and alkalis in terms of neutralisation reactions - To use the pH scale for measuring acidity/alkalinity; and indicators - To explain reactions of acids with metals to produce a salt plus hydrogen - To explain reactions of acids with alkalis to produce a salt plus water 	<p>A child will describe how to deal with hazards relating to acids and alkalis, name some common acids and alkalis and classify solutions using indicators and pH values. They will describe what happens to the pH of a solution when it is neutralised and describe some everyday uses of acids, alkalis and neutralisation.</p> <p>They will identify reactants and products in simple reactions with acids and know the test for different gases.</p>
Physics Energy	<ul style="list-style-type: none"> - To compare energy values of different foods (from labels) (kJ) - To compare power ratings of appliances in watts (W, kW) - To compare amounts of energy transferred (J, kJ, kW hour) - To have an awareness of domestic fuel bills, fuel use and costs - To understand the availability of fuels and energy resources. - With prompts sort a variety of foods by their energy values from labels and data from investigating burning food. - With prompts analyse data to compare the energy rating of appliances - With prompts uses data to calculate the value of energy transferred in appliances. - With prompts compare the increase in temperature of water to the energy output of different fuels. - With prompts identify the fuels used in their home. Calculate the amount of electricity oil gas used in their home over a period of time. - With prompts name a range of fuels used domestically and in industry. Describe the use of renewable and non-renewable energy sources. - To describe processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels. 	<p>A child should know the unit of energy.</p> <p>A child should describe the energy transfer in a variety of activities, produce energy transfer chains for these activities and identify the useful and wasted energies.</p> <p>They will sort a variety of foods by their energy values from labels and data from investigating burning food.</p> <p>They should analyse data to compare the energy rating of appliances and to calculate the value of energy transferred in appliances.</p> <p>A child should identify and compare renewable and non-renewable energy sources and uses. They should identify the energy used in their home and calculate the amount of used.</p>
Physics Forces	<ul style="list-style-type: none"> - To calculate speed and use the quantitative relationship between average speed, distance and time (speed = distance ÷ time) - To represent a journey on a distance-time graph - To understand forces as pushes or pulls, arising from the interaction between two objects - To use force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces - To understand that forces deform objects. - To know that forces are measured in newtons. - To understand measurements of stretch or compression as force is changed - To understand the effects of non-contact forces. - To know Hooke's law - To understand the effects of balanced forces - To understand forces are needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) - To understand how things change depending on direction of force and its size. - To explain the effects of pressure in liquids. - To know that gravitational force is weight and is different on the moon. - weight = mass x gravitational field strength (g), on Earth g=10 N/kg, 	<p>A child will draw force diagrams that show the type and size of forces acting on an object. They will use these to calculate resultant force using N and describe the effect of balanced and unbalanced forces on the speed, direction and shape of the object, including floating and sinking of objects.</p> <p>They should calculate speed for a variety of activities using the formula and use this formula to calculate distance travelled from the speed.</p> <p>They should interpret distance-time graphs and relate these to the forces acting on objects.</p> <p>They should describe with reference to data how the length of a spring changes as the force exerted on it changes and relate this to Hooke's Law</p> <p>They should compare mass and weight on the earth and the moon, using calculations of weight as examples.</p>



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Physics Sound	<ul style="list-style-type: none"> - To understand frequencies of sound waves, measured in hertz (Hz); - To explain echoes, reflection and absorption of sound - To understand sound needs a medium to travel, To explain the speed of sound in air, in water, in solids - To understand sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal - To compare the auditory range of humans and animals. 	<p>A child should draw and interpret sound wave images. They should describe changes in pitch and loudness of sounds as changes in vibrations, relating pitch to frequency (Hertz) of sounds and loudness to amplitude.</p> <p>A child should describe how different materials affect the direction and speed of sound waves.</p> <p>A child should describe how the ear works including ways in which hearing can be impaired and how noise pollution can be reduced, comparing hearing ranges of young and old humans and other animals.</p>
Physics Light	<ul style="list-style-type: none"> - To explore light waves travelling through a vacuum; speed of light - To 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 - To understand colours and the different frequencies of light, white light and prisms. 	<p>A child should give reasons for the difference of speed in light and sound and how speed is affected by the material through which the light travels.</p> <p>They should represent the path of light by rays and describe how light is reflected and refracted at plane surfaces.</p> <p>They should compare the path of light through the eye and a pinhole camera.</p> <p>They should describe how white light is dispersed to give coloured light and describe the effects of coloured filters and different coloured lights on the appearance of coloured objects.</p>
Physics Electricity	<ul style="list-style-type: none"> - To understand the electric current, measured in amperes, in circuits is a flow of charge. - To explain the current flow in series and parallel circuits 	<p>A child will use a model to demonstrate the flow of charge around a circuit.</p> <p>They should describe that the electric current is the same at all points in a series circuit and divides along the branches of a parallel circuit and compare and contrast the advantages of series and parallel circuit.</p>
Physics Physical changes	<ul style="list-style-type: none"> - To understand physical changes are reversible and mass is conserved - To identify similarities and differences, including density differences, between solids, liquids and gases - To explain diffusion in liquids and gases is driven by differences in concentration - To explain the difference between chemical and physical changes. - To use the differences in arrangements, in motion and in closeness of particles to explain changes of state, shape and density - To explain how changes with temperature affect motion and spacing of particles 	<p>A child should compare the properties of solids liquid gases and relate this to the arrangement of particles.</p> <p>They should describe how change in temperature may slow down particles or speed up particles and how speed affects their arrangement, the state of matter and density of the material.</p> <p>They should list the characteristics of a physical and chemical reaction with examples.</p> <p>Using the example of salt solution a child should explain how mass is conserved during a physical change. They should describe diffusion in liquids and gases.</p>