

# Science – KS3 Curriculum Threshold



Year/Progress Thresholds				Biology	Chemistry	Physics
Year 7 Expectations	Year 8 Expectations	Year 9 Expectations				
		<b>Fluent</b>	<ul style="list-style-type: none"> <li>Correctly use a microscope to view samples in greater detail.</li> <li>Label plant and animal cells; state the function of the organelles; and compare plant and animal cells.</li> <li>Describe the relationship between cells, tissues, and organs; and describe the function of the main organ systems.</li> <li>Describe feeding relationships and food webs and explain how a changing environment may affect them.</li> <li>Explain how variation allows organisms to compete and the way this drives natural selection.</li> <li>Describe how a species may become extinct.</li> <li>Explain the functions of the skeleton and describe the function of antagonistic muscle pairings.</li> <li>Explain how the use of recreational drugs and smoking can affect biological systems such as during gas exchange and gestation.</li> <li>Explain the respiratory system as a mechanism of breathing and gas exchange (to allow substances to diffuse).</li> <li>Compare aerobic to anaerobic respiration and describe the situations in which they occur.</li> <li>Describe how genetic material can be inherited.</li> </ul>	<ul style="list-style-type: none"> <li>Describe the arrangement and motion of particles in a solid, liquid, and gas, and explain properties.</li> <li>Name, describe, and explain changes of state in terms of particles.</li> <li>Classify substances as pure and impure, describe techniques to separate mixtures, and interpret a chromatogram.</li> <li>Identify with reasons, differences between atoms, elements, and compounds.</li> <li>Represent chemical reactions as word equations and apply this to the idea of conservation of mass.</li> <li>Explain how an element's position in the periodic table links to its properties and reactivity (groups 1 and 7).</li> <li>Use patterns of reactivity to make predictions for chemical reactions.</li> <li>Link the properties and uses of a metal to its position in the reactivity series.</li> </ul>	<ul style="list-style-type: none"> <li>Use diagrams with correctly labelled force arrows to display a range of forces in different situations.</li> <li>Interpret force diagrams to determine the motion of an object.</li> <li>Calculate pressure and weight using appropriate equations.</li> <li>Define current and describe its behaviour in series and parallel circuits.</li> <li>Correctly use apparatus to measure current and potential difference.</li> <li>Identify conductors and insulators and calculate resistance values using appropriate units.</li> <li>Compare light, mechanical, and sound waves.</li> <li>Describe the process of reflection, absorption, and superposition (add or cancel waves).</li> <li>Compare human and animal auditory ranges using appropriate units.</li> </ul>	
	<b>Fluent</b>	<b>Complete</b>	<ul style="list-style-type: none"> <li>Demonstrate a developing mixture of skills and proficiencies that lie between Fluent and Substantial.</li> <li>Demonstrate a developing mixture of skills and proficiencies that lie between Fluent and Substantial.</li> <li>Describe the role of Watson, Crick, Wilkins, and Franklin in the discovery of DNA structure.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate a developing mixture of skills and proficiencies that lie between Fluent and Substantial.</li> <li>Describe combustion, thermal decomposition, and oxidation.</li> <li>Describe how a catalyst affects the rate of a reaction.</li> <li>Describe the differences between an exothermic and endothermic reaction and link these to energy changes.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate a developing mixture of skills and proficiencies that lie between Fluent and Substantial.</li> <li>Describe uses of sound and ultrasound, including industrial and medical uses.</li> </ul>	
<b>Fluent</b>	<b>Complete</b>	<b>Substantial</b>	<ul style="list-style-type: none"> <li>Perform routine single- and multi-step procedures effectively, such as interpreting and communicating information effectively.</li> <li>Describe the processes of menstruation, fertilisation, gestation, and birth.</li> <li>Describe the function of each part of the flower and explain how pollination occurs.</li> <li>Describe the structure and composition of the earth and link this to the rock cycle.</li> <li>Explain how carbon is recycled in the Earth's atmosphere and link the impact of human activity to climate change.</li> <li>Recall and use notation, terminology, facts, and definitions; perform routine procedures including some multi-step procedures.</li> <li>Interpret and communicate basic information; make deductions and use reasoning to obtain results.</li> </ul>	<ul style="list-style-type: none"> <li>Identify substances as acid, alkali, or neutral based on observations with indicators and the pH scale.</li> <li>Describe neutralisation reactions and represent the reactions of acids using word equations.</li> <li>Describe the structure of an atom and draw electron configuration diagrams for named elements.</li> <li>Recall and use notation, terminology, facts, and definitions; perform routine procedures including some multi-step procedures.</li> <li>Interpret and communicate basic information; make deductions and use reasoning to obtain results.</li> </ul>	<ul style="list-style-type: none"> <li>Describe examples of energy transfers.</li> <li>Describe how thermal energy transfers from one place to another.</li> <li>Apply the law of conservation of energy to situations involving energy transfers.</li> <li>Explain how insulators are charged by friction and describe the forces between charged objects.</li> <li>Draw and interpret simple magnetic field diagrams.</li> <li>Describe how electromagnets and direct current motors work.</li> <li>Recall and use notation, terminology, facts, and definitions; perform routine procedures including some multi-step procedures.</li> <li>Interpret and communicate basic information; make deductions and use reasoning to obtain results.</li> </ul>	
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<p><b>Complete</b></p>	<p><b>Substantial</b></p>	<p><b>Establishing</b></p>	<ul style="list-style-type: none"> <li>Identify and control independent, dependent, and control variables with some guidance.</li> <li>Plan and carry out simple experiments, making adjustments as necessary.</li> <li>Select appropriate scientific equipment and techniques for investigations.</li> <li>Make detailed and accurate observations using a range of tools and instruments.</li> <li>Record data systematically in tables, charts, and diagrams.</li> <li>Use more precise measuring instruments, such as digital thermometers and stopwatches.</li> <li>Analyse data using appropriate statistical methods, including calculating averages and ranges.</li> <li>Construct and interpret more complex graphs and charts.</li> <li>Identify and describe patterns and relationships in data with increasing independence.</li> <li>Interpret data and draw conclusions based on evidence.</li> <li>Recognise the importance of fair testing and reproducibility in experiments.</li> <li>Evaluate methods and suggest detailed improvements to increase accuracy and reliability.</li> <li>Consider and describe potential sources of error in more detail.</li> </ul>	<ul style="list-style-type: none"> <li>Identify and control independent, dependent, and control variables with some guidance.</li> <li>Plan and carry out simple experiments, making adjustments as necessary.</li> <li>Select appropriate scientific equipment and techniques for investigations.</li> <li>Make detailed and accurate observations using a range of tools and instruments.</li> <li>Record data systematically in tables, charts, and diagrams.</li> <li>Use more precise measuring instruments, such as digital thermometers and stopwatches.</li> <li>Analyse data using appropriate statistical methods, including calculating averages and ranges.</li> <li>Construct and interpret more complex graphs and charts.</li> <li>Identify and describe patterns and relationships in data with increasing independence.</li> <li>Interpret data and draw conclusions based on evidence.</li> <li>Recognise the importance of fair testing and reproducibility in experiments.</li> <li>Evaluate methods and suggest detailed improvements to increase accuracy and reliability.</li> <li>Consider and describe potential sources of error in more detail.</li> </ul>	<ul style="list-style-type: none"> <li>Identify and control independent, dependent, and control variables with some guidance.</li> <li>Plan and carry out simple experiments, making adjustments as necessary.</li> <li>Select appropriate scientific equipment and techniques for investigations.</li> <li>Make detailed and accurate observations using a range of tools and instruments.</li> <li>Record data systematically in tables, charts, and diagrams.</li> <li>Use more precise measuring instruments, such as digital thermometers and stopwatches.</li> <li>Analyse data using appropriate statistical methods, including calculating averages and ranges.</li> <li>Construct and interpret more complex graphs and charts.</li> <li>Identify and describe patterns and relationships in data with increasing independence.</li> <li>Interpret data and draw conclusions based on evidence.</li> <li>Recognise the importance of fair testing and reproducibility in experiments.</li> <li>Evaluate methods and suggest detailed improvements to increase accuracy and reliability.</li> <li>Consider and describe potential sources of error in more detail.</li> </ul>
<p><b>Substantial</b></p>	<p><b>Establishing</b></p>	<p><b>Initial</b></p>	<ul style="list-style-type: none"> <li>The structure and functions of the human skeleton, to include support, protection, movement, and making blood cells.</li> <li>Biomechanics – the interaction between skeleton and muscles including the measurement of force exerted by different muscles.</li> <li>The function of muscles and examples of antagonistic muscles.</li> <li>The effects of recreational drugs (including substance misuse) on behaviour, health, and life processes.</li> <li>The structure and functions of the gas exchange system in humans including adaptations to function.</li> <li>The role of diffusion in the movement of materials in and between cells.</li> <li>The mechanism of breathing to move air in and out of the lungs using a pressure model to explain the movement of gases including simple measurements of lung volume.</li> <li>The impact of exercise, asthma, and smoking on the human gas exchange system.</li> <li>Reproduction in humans (as an example of a mammal) to include the effect of maternal lifestyle on the foetus through the placenta.</li> <li>Aerobic and anaerobic respiration in living organisms including the breakdown of organic molecules to enable all the other chemical processes necessary for life.</li> <li>A word summary for aerobic respiration.</li> <li>The process of anaerobic respiration in humans and microorganisms, including fermentation and a word summary for anaerobic respiration.</li> <li>The differences between aerobic and anaerobic respiration in terms of the reactants, the products formed, and the implications for the organism.</li> <li>Heredity is the process by which genetic information is transmitted from one generation to the next.</li> <li>A simple model of chromosomes, genes, and DNA in heredity including the part played by Watson, Crick, Wilkins, and Franklin in the development of the DNA model.</li> </ul>	<ul style="list-style-type: none"> <li>A simple Dalton (and Bohr) atomic model.</li> <li>Representing chemical reactions using formulae and using (symbol) equations.</li> <li>Displacement reactions.</li> <li>Reactions of acids with metals to produce a salt plus hydrogen.</li> <li>The properties of metals and non-metals.</li> <li>The chemical properties of metal and non-metal oxides with respect to acidity.</li> <li>The order of metals and carbon in the reactivity series.</li> <li>The use of carbon in obtaining metals from metal oxides.</li> <li>Reactions of acids with metal carbonates to produce salt + water + carbon dioxide.</li> <li>Recall and use basic scientific terminology and concepts.</li> <li>Identify simple independent and dependent variables.</li> <li>Follow given instructions to set up basic experiments.</li> <li>Recognise and identify common scientific equipment.</li> <li>Make simple observations and record them accurately.</li> <li>Use basic tools and instruments to measure, such as rulers and thermometers.</li> <li>Collect data in a structured format, such as tables.</li> <li>Perform basic calculations and summarise data using simple statistics (mean, median).</li> <li>Create basic graphs and charts to represent data visually.</li> <li>Identify patterns and trends in data with guidance.</li> <li>Provide basic interpretations of data and observations.</li> <li>Recognise the need for repeated trials to improve reliability.</li> <li>Identify basic sources of error and suggest simple improvements.</li> </ul>	<ul style="list-style-type: none"> <li>A simple Dalton (and Bohr) atomic model.</li> <li>Representing chemical reactions using formulae and using (symbol) equations.</li> <li>Displacement reactions.</li> <li>Reactions of acids with metals to produce a salt plus hydrogen.</li> <li>The properties of metals and non-metals.</li> <li>The chemical properties of metal and non-metal oxides with respect to acidity.</li> <li>The order of metals and carbon in the reactivity series.</li> <li>The use of 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<b>Establishing</b>	<b>Initial</b>		<ul style="list-style-type: none"> <li>The interdependence of organisms in an ecosystem including food webs and insect-pollinated crops.</li> <li>The cause, ideal conditions, and importance of the decay process.</li> <li>How organisms affect and are affected by their environment, including the accumulation of toxic materials.</li> <li>The variation between species and between individuals of the same species means some organisms compete more successfully which can drive natural selection.</li> <li>Changes in the environment may leave individuals within a species and some entire species less well adapted to compete successfully and reproduce, which in turn may lead to extinction.</li> <li>The importance of maintaining biodiversity.</li> <li>The use of gene banks to preserve hereditary material.</li> </ul>	<ul style="list-style-type: none"> <li>Properties of ceramics, polymers, and composites (qualitative).</li> <li>The composition of the Earth.</li> <li>The structure of the Earth.</li> <li>The rock cycle and the formation of igneous, sedimentary, and metamorphic rocks.</li> <li>Earth as a source of limited resources and the efficacy of recycling.</li> <li>The carbon cycles.</li> <li>The composition of the atmosphere.</li> <li>The production of carbon dioxide by human activity and the impact on climate.</li> </ul>	<ul style="list-style-type: none"> <li>A simple Dalton (and Bohr) atomic model.</li> <li>Representing chemical reactions using formulae and using (symbol) equations.</li> <li>Displacement reactions.</li> <li>Reactions of acids with metals to produce a salt plus hydrogen.</li> <li>The properties of metals and non-metals.</li> <li>The chemical properties of metal and non-metal oxides with respect to acidity.</li> <li>The order of metals and carbon in the reactivity series.</li> <li>The use of carbon in obtaining metals from metal oxides.</li> <li>Reactions of acids with metal carbonates to produce salt + water + carbon dioxide.</li> </ul>
<b>Initial</b>			<ul style="list-style-type: none"> <li>Cells as the fundamental unit of living organisms including how to observe, interpret and record cell structure using a light microscope.</li> <li>The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria, and chloroplasts.</li> <li>The similarities and differences between plant and animal cells.</li> <li>The role of diffusion in the movement of materials in and between cells.</li> <li>The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.</li> <li>The structural adaptations of some unicellular organisms.</li> <li>The tissues and organs of the human digestive system including adaptations to function and how the digestive system digests food.</li> <li>The structure and functions of the gas exchange system in humans.</li> </ul>	<ul style="list-style-type: none"> <li>Explain the properties of the different states of matter (solid, liquid, and gas) in terms of the particle model including gas pressure.</li> <li>Explain changes of state in terms of the particle model.</li> <li>Know that conservation of mass applies to changes of state.</li> <li>Define the concept of a pure substance.</li> <li>Describe what is meant by mixtures including dissolving.</li> <li>Explain diffusion in terms of the particle model.</li> <li>Describe simple techniques for separating mixtures: filtration, evaporation, distillation, and chromatography.</li> <li>Identify pure substances.</li> </ul>	<ul style="list-style-type: none"> <li>Forces as pushes or pulls arising from the interaction between two objects.</li> <li>Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces.</li> <li>Forces associated with rubbing and friction between surfaces, resistance to motion of air and water.</li> <li>Forces measured in newtons.</li> <li>Forces needed to cause objects to stop or start moving, or to change their speed or direction of motion.</li> <li>Pressure measured by the ratio of force over area – acting normal to any surface.</li> <li>Gravity force weight = mass x gravitational field strength (g) on Earth <math>g=10 \text{ N/kg}</math>.</li> <li>Speed and the quantitative relationship between mean speed, distance, and time (speed = distance ÷ time).</li> <li>The representation of a journey on a distance-time graph.</li> <li>Relative motion: trains and cars passing one another.</li> </ul>