

# Curriculum Area: KS3 Science



Year 7

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	<p><b>Energy / Waves</b></p> <p><b>Energy</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>comparing energy values of different foods</li> <li>comparing power ratings of appliances in watts</li> <li>domestic fuel bills, fuel use and costs</li> <li>fuels and energy resources</li> <li>energy as a quantity that can be quantified and calculated</li> <li>comparing the starting with the final conditions of a system and describing increases and decreases in stores of energy</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>evaluate risks</li> <li>Use a light microscope from previous units:</li> <li>KS2 Animals including humans</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>KS3 Energy</li> <li>GCSE Energy model, Energy resources, Energy calculations</li> </ul> <p><b>Waves</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>waves can be reflected, and add or cancel – superposition</li> <li>the similarities and differences between light waves and waves in matter</li> <li>light waves travelling through a vacuum; speed of light</li> <li>the transmission of light through materials: absorption, diffuse scattering, and specular reflection at a surface</li> <li>use of ray model to explain imaging</li> <li>light transferring energy from source to absorber</li> <li>colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Plot two variables from experimental or other data</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Light</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>KS3 Waves</li> <li>GCSE Wave properties, EM waves</li> </ul>	<p><b>Cells / Reproduction</b></p> <p><b>Cells</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>multicellular organisms are composed of cells which are organised into tissues, organs, and systems to carry out life processes.</li> <li>there are many different types of cell, each with a different structure or feature so it can do a specific job.</li> <li>plant and animal cells have a cell membrane, nucleus, cytoplasm, and mitochondria.</li> <li>plant cells also have a cell wall, chloroplasts and usually a permanent vacuole.</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Use a light microscope to observe cells.</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Living things and their habitats; Plants.</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE combined science and biology – Cell structure and transport.</li> <li>A-Level biology – Cell structure</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Substitute numerical values into algebraic equations</li> <li>Solve simple algebraic equations</li> </ul> <p><b>Reproduction</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>the menstrual cycle prepares the female for pregnancy and stops if the egg is fertilised by a sperm</li> <li>the developing foetus relies on the mother for oxygen and nutrients and to remove waste</li> <li>the menstrual cycle lasts approximately 28 days</li> <li>if an egg is fertilized it settles into the uterus lining</li> <li>causes of low fertility in male and female reproductive systems.</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation, and birth, to include the effect of maternal lifestyle on the foetus through the placenta</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Living things and their habitats.</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE combined science and biology – Hormonal coordination</li> </ul>	<p><b>Particle model of matter / Elements, compound, and mixtures</b></p> <p><b>Particle model of matter</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>the properties of solids, liquids and gases can be described in terms of particles in motion but with differences in the arrangement and movement of these particles.</li> <li>observations where substances change temperature or state can be described in terms of particles gaining or losing energy.</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Using models to represent the unobservable</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Solids, liquids, and gases</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE combined science and chemistry – Atomic structure</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Substitute numerical values into algebraic equations using appropriate units for physical quantities.</li> </ul> <p><b>Elements, compounds, and mixtures</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>a pure substance consists of only one type of element</li> <li>substances have different properties because of the elements they contain</li> <li>most substances are not pure elements, but compounds or mixtures containing atoms of different elements.</li> <li>a compound and has a fixed melting and boiling point.</li> <li>mixtures may be separated due to differences in their physical properties. The method chosen to separate a mixture depends on which physical properties of the individual substances are different.</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Using models to represent the unobservable</li> </ul> <p>Links to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Properties and changes of materials</li> <li>KS3 Particle model of matter</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE combined science and chemistry – Atomic structure</li> </ul>	<p><b>Forces / Electricity</b></p> <p><b>Forces</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>speed and the quantitative relationship speed = distance ÷ time</li> <li>the representation of a journey on a distance-time graph</li> <li>forces as pushes or pulls, using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces</li> <li>forces measured in newtons</li> <li>change in motion depending on direction of force and its size</li> <li>non-contact forces: gravity forces acting at a distance on Earth and in space</li> <li>gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg.</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>use and derive simple equations and carry out appropriate calculations</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Substitute numerical values into algebraic equations using appropriate units for physical quantities</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Forces and magnets, Forces</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>KS3 Forces, Energy</li> <li>GCSE Motion and forces I &amp; II, Resultant force</li> </ul> <p><b>Electricity</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>electric current, potential difference and resistance</li> <li>differences in resistance between conducting and insulating components</li> <li>separation of positive or negative charges</li> <li>the idea of electric field, forces acting across the space between objects not in contact</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>use and derive simple equations and carry out appropriate calculations</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Solve simple algebraic equations</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Electricity</li> <li>KS3 Particle model (Chemistry), Energy</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>KS3 Magnetism</li> <li>GCSE Electric circuits, Domestic electricity, Electricity applications, Static electricity, Magnetism &amp; electromagnetism</li> </ul>	<p><b>Chemical reactions / Acid reactions</b></p> <p><b>Chemical reactions</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>chemical changes can be described by a model where atoms and molecules in reactants rearrange to make the products and the total number of atoms is conserved.</li> <li>combustion, thermal decomposition, oxidation, and displacement reactions</li> <li>exothermic and endothermic chemical reactions (qualitative)</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>write word equations from information about chemical reactions.</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Solids, liquids, and gases</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE combined science and chemistry – Chemical changes.</li> </ul> <p><b>Acid reactions</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>defining acids and alkalis in terms of neutralisation reactions</li> <li>the pH scale for measuring acidity / alkalinity; and indicators</li> <li>reactions of acids with metals to produce a salt plus hydrogen</li> <li>reactions of acids with alkalis to produce a salt plus water</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>write word equations from information about chemical reactions</li> <li>use data and observations to determine the pH of a solution and explain what this shows</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Particle model of matter; KS3 Elements and compounds.</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE combined science and chemistry – Chemical changes</li> </ul>	<p><b>Variation and inheritance / Gas exchange</b></p> <p><b>Variation &amp; Inheritance</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>heredity as 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> <li>differences between species</li> <li>the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation</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> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Plot bar charts or line graphs to show discontinuous or continuous variation data</li> <li>Use a diagram to show how genes are inherited.</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>Living things and their habitats</li> </ul> <p><b>Gas exchange</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>the structure and functions of the gas exchange system in humans, including adaptations to function</li> <li>the mechanism of breathing to move air in and out of the lungs, using a pressure model</li> <li>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> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Explain how exercise, smoking and asthma affect the gas exchange system.</li> <li>Explain how the parts of the gas exchange system are adapted to their function.</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Animals</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE combined science and biology – Organising animals.</li> </ul>
<b>Assessments</b>	<b>Test: Energy / Waves</b>	<b>Test: Cells / Reproduction</b>	<b>Test: Particle model of matter / Elements, compounds, and mixtures</b>	<b>Test: Forces / Electricity</b>	<b>Test: Acid reactions / Chemical reactions</b>	<b>Test: Variation &amp; Inheritance / Gas Exchange</b>

# Curriculum Area: KS3 Science



## Year 8

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	<b>Organisms</b>	<b>Solubility / Metal reactions</b>	<b>Energy / Forces</b>	<b>Plant biology</b>	<b>Chemical reactions / Atomic structure</b>	<b>Magnetism / Waves / Space physics</b>
	<p><b>Organisms</b> Substantive knowledge headlines:</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>content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed</li> <li>calculations of energy requirements in a healthy daily diet</li> <li>the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases</li> <li>the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)</li> <li>the structure and functions of the gas exchange system in humans, including adaptations to function</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>the effects of recreational drugs (including substance misuse) on behaviour, health and life processes</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>the process of anaerobic respiration in humans and micro-organisms, 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> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Describe possible health effects of unbalanced diets from data provided.</li> <li>Use word equations to describe aerobic and anaerobic respiration</li> <li>Use a diagram to predict the result of a muscle contraction or relaxation</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Calculate food requirements for a healthy diet, using information provided.</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Animals</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE - Organisation and the digestive system</li> <li>GCSE - Organising plants and animals</li> <li>GCSE - Non-communicable diseases</li> </ul>	<p><b>Solubility</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>How to explain how substances dissolve using the particle model</li> <li>How using different solvents effects solubility.</li> <li>How to make a solution saturated</li> <li>How to explain, using the particle model, why solutions become saturated.</li> <li>Temperature can affect the solubility of a solid solute.</li> <li>Pure substances have fixed and distinct melting and boiling points and that these are affected by the addition of impurities</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>How to write a concise method for a planned investigation</li> <li>How to present results from an investigation in a table</li> <li>How to plot results from solubility experiment as a graph.</li> <li>Analyse and interpret solubility curves</li> <li>Use the solubility curve of a solute to explain observations about solutions.</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Graph plotting, interpretation</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 dissolving</li> <li>KS3 Energy (Physics), Particle model (Chemistry)</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Particles, Bonding, Structure &amp; properties</li> </ul> <p><b>Metals</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>Metals are found on the left of the periodic table</li> <li>Typical physical properties of metals</li> <li>Metals can be mixed to form alloys with desired properties.</li> <li>Alloys are harder than pure metals in terms of distortion of the layers of atoms in the structure of a pure metal</li> <li>The products of chemical reactions between metals water and oxygen,</li> <li>The products of chemical reactions between metals and acids,</li> <li>The reactivity of metals can be compared by studying reaction of metals</li> <li>The reactivity of metals is given as their place in the electrochemical series</li> <li>More reactive metals can displace less reactive metals from compounds</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>How to write a plan for an investigation from a given hypothesis</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Balance chemical equations</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Materials</li> <li>KS3 Particle model, elements compounds, chemical reactions</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Particles, Bonding, Structure &amp; properties</li> </ul>	<p><b>Energy</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>simple machines</li> <li>heating and thermal equilibrium</li> <li>using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>make predictions using scientific knowledge and understanding</li> <li>apply mathematical concepts and calculate results</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Use ratios, fractions and percentages</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Forces</li> <li>KS3 Energy, Particle model (Chemistry)</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Particles, Resultant force, Energy calculations</li> </ul> <p><b>Forces</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>moment as the turning effect of a force</li> <li>forces: associated with deforming objects; with rubbing and friction between surfaces; resistance to motion of air and water</li> <li>forces measured in newtons</li> <li>force-extension linear relation; Hooke's Law as a special case</li> <li>work done and energy changes on deformation</li> <li>atmospheric pressure, pressure in liquids, upthrust effects, floating and sinking</li> <li>pressure measured by ratio of force over area – acting normal to any surface</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>understand and use SI units</li> <li>use and derive simple equations and carry out appropriate calculations</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Change the subject of an equation</li> <li>Substitute numerical values into algebraic equations using appropriate units for physical quantities</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Forces</li> <li>KS3 Forces</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Resultant force</li> <li>GCSE Pressure</li> <li>GCSE Energy calculations</li> <li>GCSE Forces and driving</li> </ul>	<p><b>Plant Biology</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>the reactants in, and products of, photosynthesis, and a word summary for photosynthesis</li> <li>the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere</li> <li>the adaptations of leaves for photosynthesis.</li> <li>the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops</li> <li>the importance of plant reproduction through insect pollination in human food security</li> <li>how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Explain why other organisms are dependent on photosynthesis.</li> <li>Explain effects of environmental changes and toxic materials on a species' population.</li> <li>Explain issues with human food supplies in terms of insect pollinators.</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Read values from a line graph</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Plants</li> <li>KS2 Living things and their habitats</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Photosynthesis</li> <li>GCSE Adaptations, interdependence, and competition.</li> <li>GCSE Organising an ecosystem</li> </ul>	<p><b>Chemical Reactions</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>Combustion is a reaction between a substance and oxygen where oxides are the products</li> <li>Metal oxides are basic, non-metal oxides are acidic</li> <li>How to produce precipitation reactions using information on solubility</li> <li>Thermal decomposition of carbonates produces carbon dioxide. Limewater is used to test for carbon dioxide</li> <li>Temperature changes during reactions indicate whether a reaction is exothermic or endothermic.</li> <li>How to analyse graphical data on endothermic and exothermic reactions</li> <li>Mass is conserved in chemical reactions</li> <li>Elements combine in fixed proportions to form compounds</li> <li>How to state the names and numbers of atoms in a chemical compound from its formula.</li> <li>What a chemical formula shows and how to write the chemical formula for simple compounds based on their elements position in the periodic table.</li> <li>How to convert symbol equations into word equations</li> <li>How to balance chemical symbol equations</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Use of control variables to ensure data collected is valid</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Graph plotting, interpretation</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Energy (Physics), Particle model. Chemical reactions</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Chemical Changes, Energy Changes</li> </ul> <p><b>Atomic Structure</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>Elements are grouped in the periodic table according to their properties</li> <li>The periodic table was developed as several scientists made attempts to classify elements and that Mendeleev's Periodic table is the version that we use now.</li> <li>The Periodic Table is a list of the elements in order of increasing atomic (proton) number.</li> <li>Atoms are tiny particles made up of subatomic particles called protons, electrons and neutrons</li> <li>The number protons in an atom relates to its position in the periodic table.</li> <li>The relative mass and charge on protons, electrons and neutrons</li> <li>How to represent electron configuration and relate it to position in the periodic table.</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Developments in science can be as a result of many people working on the same problem.</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Addition, subtraction, calculation of weighted mean.</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Energy(Physics), Particle model. Chemical reactions</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Chemical Changes, Energy Changes</li> </ul>	<p><b>Magnetism</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>magnetic poles, attraction and repulsion</li> <li>magnetic fields by plotting with compass, representation by field lines</li> <li>the magnetic effect of a current</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Translate information between graphical and numeric form</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Forces and magnets</li> <li>KS3 Forces, Electric circuits</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Magnetism &amp; electromagnetism</li> </ul> <p><b>Waves</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>waves can be reflected, and add or cancel – superposition</li> <li>Pressure waves transferring energy, and uses</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>The importance of publishing results and peer review</li> <li>Evaluate risks</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Translate information between graphical and numeric form</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Light, sound</li> <li>KS3 Waves</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Wave properties, EM waves, radioactivity</li> </ul> <p><b>Space physics (optional)</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>our sun as a star, other stars in our galaxy, other galaxies</li> <li>the seasons and the Earth's tilt, day length at different times of year, in different hemispheres</li> <li>the light year as a unit of astronomical distance</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Forces, Waves</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Space physics (Triple only)</li> </ul>
<b>Assessments</b>	<b>Biology block 1 test</b>	<b>Chemistry block 1 test</b>	<b>Physics block 1 test</b>	<b>Biology block 2 test</b>	<b>Chemistry block 2 test</b>	<b>Physics block 2 test</b>

# Curriculum Area: KS3 Science



## Year 9

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	<p><b>Cell structure and transport</b></p> <p><b>Cell structure and transport</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>cells as the basic structural unit of all organisms; adaptations of cells related to their functions; the main sub-cellular structures of eukaryotic and prokaryotic cells</li> <li>the need for transport systems in multicellular organisms, including plants</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>use a light microscope to observe, draw and label a selection of plant and animal cells.</li> <li>investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue.</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Cells</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Cell division</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Recognise and use expressions in decimal form</li> <li>Recognise and use expressions in standard form</li> <li>Make order of magnitude calculations</li> <li>Plot two variables from experimental or other data</li> </ul>	<p><b>Atoms, ions and analysis</b></p> <p><b>Atoms, ions and analysis</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>Mixtures are separated by physical methods</li> <li>Chromatography is a method for separating mixtures</li> <li>Chemical equations can be written as words or as symbols</li> <li>How the periodic table was developed by scientists (Mendeleev)</li> <li>Understanding about atoms has developed over time (Dalton-Bohr)</li> <li>Atoms are neutrally charged as they have the same number of protons as electrons.</li> <li>Represent electron in atoms according to the Bohr model</li> <li>Ions are formed by atoms losing or gaining electrons.</li> <li>How to test for some positive ions (Flame tests and precipitation)</li> <li>How to test for Halides, carbonates, sulphate ions</li> <li>How to test for common gases, Oxygen, carbon dioxide, hydrogen</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Using a variety of concepts and models to develop scientific explanations and understanding</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Particles, Chemical reactions</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Atomic structure, Periodic table Chemical analysis</li> </ul>	<p><b>Models / Electric circuits</b></p> <p><b>Energy model</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>Energy stores and transfers</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Using a variety of concepts and models to develop scientific explanations and understanding</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Energy</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Energy resources, Particles, Energy calculations</li> </ul> <p><b>Atomic structure (development of the model)</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>The nuclear model and its development in the light of changing evidence</li> <li>Sizes of nuclei and atoms</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>The ways in which scientific methods and theories develop over time</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Using prefixes and powers of ten for orders of magnitude</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Particle model of matter; Atomic structure (Chemistry)</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Radioactivity, Nuclear equations and atomic structure (Chemistry)</li> </ul> <p><b>Electric circuits</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>measuring resistance using p.d. and current measurements</li> <li>quantity of charge flowing as the product of current and time</li> <li>drawing circuit diagrams; exploring equivalent resistance for resistors in series</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>using an appropriate number of significant figures in calculations</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Solve simple algebraic equations</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Electric circuits</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Domestic electricity, Electricity applications, Magnetism &amp; electromagnetism</li> </ul>	<p><b>Organising animals and plants</b></p> <p><b>Organising animals and plants</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>the relationship between the structure and functions of the human circulatory system.</li> <li>the need for transport systems in multicellular organisms, including plants.</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>Evaluate risks related to use of blood products</li> <li>Evaluate methods of treatment bearing in mind the benefits and risks associated with the treatment.</li> <li>Investigate the distribution of stomata and guard cells</li> <li>Measure the rate of transpiration by the uptake of water</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS2 Animals</li> <li>KS3 Cells</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Photosynthesis</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Use ratios, fractions and percentages</li> </ul>	<p><b>Rates of reaction</b></p> <p><b>Rates of reaction</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>How to identify reactants and products in a chemical equation</li> <li>That chemical equations can be written as words or as symbols</li> <li>That chemical symbol equations need to be balanced</li> <li>How to balance chemical equations</li> <li>Mass is conserved in chemical reactions</li> <li>Relate conservation of mass in reactions to formula mass of compounds</li> <li>Rate of reaction is calculated by change in concentration / time.</li> <li>Chemical reactions start fast and slow down before stopping.</li> <li>Temperature, concentration, surface area, catalysts all affect the rate of a chemical reaction</li> <li>Explain the effects of Temperature, concentration, surface area, catalysts on the rate of chemical reactions in terms of collisions between particles.</li> <li>Plot rates of reaction graphs.</li> <li>Calculate mean rate of reaction from a graph or table of results</li> <li>How to calculate the rate of reaction at a given time by calculating the gradient of a tangent to the rates curve.</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>The use of control variables to ensure valid data is collected</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Calculate gradient of a graph, draw tangent to a curve</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Particles, Chemical reactions</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Atomic structure, Periodic table Rates and equilibrium</li> </ul>	<p><b>Motion and forces</b></p> <p><b>Motion and forces</b> Substantive knowledge headlines:</p> <ul style="list-style-type: none"> <li>speed of sound, estimating speeds in everyday contexts</li> <li>interpreting quantitatively graphs of distance, time, and speed</li> <li>acceleration caused by forces; Newton's First Law</li> <li>weight and gravitational field strength</li> <li>forces and fields: gravity</li> <li>forces as vectors</li> </ul> <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> <li>using a variety of concepts and models to develop scientific explanations and understanding</li> <li>applying a knowledge of a range of techniques, apparatus, and materials to select those appropriate both for experiments</li> <li>communicating the scientific rationale for investigations, including the methods used, the findings and reasoned conclusions</li> <li>recognising the importance of scientific quantities and understanding how they are determined</li> </ul> <p>Math skills:</p> <ul style="list-style-type: none"> <li>Recognise and use expressions in decimal form</li> <li>Make estimates of the results of simple calculations</li> <li>Find arithmetic means</li> <li>Change the subject of an equation</li> <li>Substitute numerical values into algebraic equations using appropriate units for physical quantities</li> <li>Solve simple algebraic equations</li> <li>Translate information between graphical and numeric form</li> <li>Understand and use the symbols: =, &lt;math&gt;\propto&lt;/math&gt;, ~</li> </ul> <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> <li>KS3 Motion and forces</li> </ul> <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> <li>GCSE Motion and forces II</li> <li>GCSE Resultant forces</li> <li>GCSE Forces and driving</li> </ul>
Assessments	Block 1 Biology test	Block 1 Chemistry test	Block 1 Physics test	Block 2 Biology test	Block 2 Chemistry test	Block 2 Physics test