





# Science Curriculum Map- KS3 Chemistry

<p><b>Intent:</b></p> <ul style="list-style-type: none"><li>• Inspire students about the world around them through a topical and challenging curriculum- give them curiosity about the world around them. Inspire a love of learning Science and aspirations to study Science at a higher level. To understand the careers that can evolve from learning different areas of Science.</li><li>• Support student’s emotional, social, physical, and political development. To be able to form non biased and educated discussions around development of challenging scientific technologies and ideas, within a changing world.</li><li>• Provide students with the knowledge and understanding to make links across subjects and contexts throughout their lives.</li><li>• Support students to develop empathy and understand their role and responsibility to the world around them</li></ul>	<p><b>Intrinsic Subject Value</b></p> <p>Science knowledge itself. Careers, wider world, big ideas threaded through the curriculum.</p>
<p><b>KS2 ‘Subject’ Curriculum</b></p> <p>Pupils should have studied living things and their habitats, animals including humans, properties and changes of materials, earth and space, forces, evolution and inheritance, light, electricity, seasonal changes, rocks, states of matter, and sound.</p> <p>Pupils should have also been taught to plan different types of scientific enquiries to answer questions, take measurements, use a range of scientific equipment, record data and results, use test results to make predictions, report and present findings from enquires and identify scientific evidence that has been used to support or refute ideas or arguments.</p>	<p><b>Science themes that run through the curriculum</b></p> <ul style="list-style-type: none"><li>• <b>Careers, wider world,</b></li></ul> <p> Non biased discussions around new technologies</p> <p> Empathy in the world around them</p> <p> Links across subjects</p> <p> Fundamental building block atoms and particles linked through the curriculum</p> <p><b>Disciplinary Knowledge:</b> Scientific attitudes Experimental Skills and investigation Analysis and Evaluation Measurement</p>

Themes	Year 7	Year 8	Year 9
<p>Particles</p>	<p><b>SOL Title: <u>Particles and their behaviour</u></b> <span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 20px; height: 10px; vertical-align: middle;"></span> <span style="background-color: green; border: 1px solid black; display: inline-block; width: 20px; height: 10px; vertical-align: middle;"></span></p> <p><i>Wider world and careers: Careers in forensic science, chemical engineer, environmental chemist, lab technicians, environmental chemist</i></p> <p><b>Substantive Knowledge:</b></p> <ul style="list-style-type: none"> <li>• All materials are made up of particles.</li> <li>• There are three states of matter and ideas about particles can be used to explain the properties of a substance in its three states</li> <li>• When exposed to different temperatures substances will change state. This can be described as melting, boiling or freezing.</li> <li>• Different substances will melt or boil at different temperatures – melting point.</li> <li>• <b>Melting points can be used to identify substances and check the purity.</b></li> <li>• <b>Boiling points can be used to identify substances and predict the state of different substances.</b></li> <li>• Due to changes of temperature substances can evaporate or condense.</li> <li>• <b>The process of evaporation is useful e.g. sweating</b></li> <li>• ‘Diffusion’ is the random moving and mixing of particles and diffuse due to the movement of particles.</li> <li>• <b>Temperature, particle size and state of substance have an effect on the speed of diffusion.</b></li> <li>• <b>Gas pressure is effected by the number of particles and the temperature.</b></li> </ul> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Using the particle model to be able to explain why different materials have different properties.</li> <li>• Use the particle model to explain changes of states involving solids, liquids and gases. (Including -</li> <li>• <b>Interpret data about melting and boiling points.</b></li> <li>• <b>Use the idea of Brownian’s model when discussing diffusion and the movement of particles in solids, liquids and gases.</b></li> </ul> <p><b>Prior learning / retrieval:</b> Pupils should be able to:</p> <ul style="list-style-type: none"> <li>• Compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>• Understand that some materials change state when they are heated or cooled</li> <li>• Understand what happens during the process of evaporation and condensation</li> </ul> <p><b>Links to KS3 NC:</b> The particulate nature of matter-</p> <ul style="list-style-type: none"> <li>• Properties of different states of mater in terms of the particle model, including gas pressure.</li> <li>• Changes of state in terms of the particle model.</li> <li>• Diffusion in terms of the particle model.</li> </ul> <p><b>Disciplinary literacy:</b> Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for</p>		

	<p>each lesson will be highlighted on objective sheets and knowledge organiser.</p> <p>Key Scientific Terms: Solid, liquid, gas, particles change of state, Brownian Motion, particle model, gas pressure, Melting point, Freezing point, boiling point</p> <p><b>Summative assessment:</b> Short Answer recall question assessment End of term assessment</p>		
<h2>Atoms and elements</h2>	<p><b>Atoms, elements and compounds</b> <span style="background-color: yellow; border: 1px solid black; padding: 2px;"> </span></p> <p><i>Wider world and careers: Careers in forensic science, chemical engineer, environmental chemist, lab technicians, environmental chemist</i></p> <p><b>Substantive Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Structure of an atom</li> <li>• Daltons Model of atom</li> <li>• An element is a substance that cannot be broken down into other substances.</li> <li>• The Periodic Table lists the elements. Elements with similar properties are grouped together.</li> <li>• Every element has its own chemical symbol which scientists all over the world use to identify the element.</li> <li>• An atom is the smallest part of an element that can exist</li> <li>• There are 92 elements that exist naturally and therefore 92 types of atom.</li> <li>• The properties of elements are the properties of very man atoms joined together</li> <li>• A compound is a substance made up of atoms which are bonded together</li> <li>• <b>A compound has different properties to the elements in it as compounds can be made up of different elements</b></li> <li>• Chemical formula show the relative number of atoms of each element in a compound</li> <li>• In the Periodic Table metals are on the left of the stepped line and non-metals are on the right</li> <li>• Most metals have high melting points. They are good conductors of heat and electricity. They are shiny and have high densities. They are malleable, ductile and sonorous</li> <li>• Most non-metals have low melting points. They are poor conductors of heat and electricity. In the solid state they are dull and brittle</li> <li>• <b>You can use the arrangement of elements in the Periodic Table to explain and predict patterns in physical and chemical properties</b></li> <li>• Mendeleev</li> <li>• In the Periodic Table the horizontal rows are periods</li> <li>• In the Periodic Table the vertical columns are groups</li> <li>• Going across periods and down groups there are patterns in the elements properties</li> <li>• Basic group 1 and group 7</li> </ul> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>• <b>Looking at the development of the periodic table and Mendeleev</b></li> <li>• Discussing what lead to the discovery of new elements</li> <li>• Looking at the properties of metals non-metals and investigating those properties</li> </ul>	<p><b>SQL Title: Separation techniques</b> <span style="background-color: yellow; border: 1px solid black; padding: 2px;"> </span></p> <p><i>Wider world and careers: Careers in the petroleum industry, biotechnology and biochemical processes, forensic Science and the pharmaceutical industry and chemical industry. So many products rely on these techniques and processes. Also, important careers in forensic science and solving crimes. These techniques are used to find evidence to solve them.</i></p> <p><b>Substantive Knowledge:</b></p> <ul style="list-style-type: none"> <li>• A mixture is made up of substances that are not chemically joined together</li> <li>• <b>In a mixture, the substances keep their own properties. You can change the amounts of substances</b></li> <li>• A pure substance has a sharp melting point.</li> <li>• An impure substance does not have a sharp melting point</li> <li>• A solution is a mixture of a liquid with a solid or gas. <b>All parts of the solutions are the same. You cannot see the separate substances</b></li> <li>• In a solution, the liquid in which the solute dissolved is called the solvent</li> <li>• <b>Solvents include water, propanone and ethanol</b></li> <li>• <b>When a substance dissolves, solvent particles surround the solute particles</b></li> <li>• A saturated solution is a solution in which no more solute can dissolve</li> <li>• <b>The solubility of a substance is the mass that dissolves in 100g of water. Every substance has its own solubility</b></li> <li>• The solubility of a substance varies with temperature</li> <li>• Substances that cannot dissolve in a certain solvent are insoluble in that solvent</li> <li>• Filtration separates a liquid from an insoluble solid. It also separates a solution from a solid that is mixed with it, but not dissolved</li> <li>• You can separate a solute from its solution by evaporation</li> <li>• You can separate a solvent from its solution by distillation</li> <li>• <b>Fractional distillation uses a condenser. The job of the condenser is to cool the water vapour and condense it back to liquid</b></li> <li>• You can separate substances in a mixture by chromatography if all the substances are soluble in the same solvent</li> </ul> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Identify pure substances from a graph</li> <li>• <b>Be able to safely and effectively carry out filtration and separate a solution from an insoluble solid</b></li> <li>• Be able to describe the method used to use evaporation to separate mixtures</li> </ul>	<p><b>Patterns in the periodic table</b> <span style="background-color: yellow; border: 1px solid black; padding: 2px;"> </span></p> <p><i>Wider world and careers: Careers in the petroleum industry, biotechnology and biochemical processes, forensic Science and the pharmaceutical industry and chemical industry. So many products rely on these techniques and processes. Also, important careers in forensic science and solving crimes. These techniques are used to find evidence to solve them</i></p> <p><b>Substantive Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Review of the periodic table, atoms, elements molecules and compounds</li> <li>• <b>Review Mendeleev and the periodic table</b></li> <li>• Structure of atom and electron shells</li> <li>• <b>You can use the arrangement of elements in the Periodic Table to explain and predict patterns in physical and chemical properties</b></li> <li>• Group 1 elements are metals and have low melting and boiling points and low densities. They are reactive</li> <li>• Group 1 elements react vigorously with water <b>to make hydroxides and hydrogen</b>. The reactions get more vigorous from top to bottom of the group</li> <li>• Group 7 as known as the halogens</li> <li>• Going down group 7, melting and boiling points increase. The colours of the elements get darker. They are reactive</li> <li>• Reactivity decreases as you go down Group 7.</li> <li>• <b>In a displacement reaction a more reactive element displaces a less reactive element from its compounds</b></li> <li>• Group 0 elements are called the noble gases. They are unreactive</li> <li>• At room temperature, Group 0 elements are colourless gases</li> <li>• As you go down group 0 the boiling point of the elements increases</li> <li>• Uses for noble gases include: Neon signs, balloons, double glazing</li> <li>• The most reactive metals are at the top</li> <li>• When potassium, sodium and lithium react with dilute acid they explode. The products are metal salts and hydrogen</li> <li>• When potassium, sodium, lithium and calcium react with water they react vigorously. <b>The products are a metal hydroxide solution and hydrogen</b></li> <li>• When potassium, sodium, lithium, calcium, magnesium, zinc and iron react on heating with air, they burn vigorously. The products are metal oxides</li> <li>• <b>More reactive metals displace less reactive metals from compounds</b></li> <li>• <b>Zinc, and metals below it in the reactivity series are extracted by heating their oxides with carbon</b></li> <li>• <b>Extracting metals and pro and cons of this process</b></li> <li>• Changes of state are known as a physical reaction</li> <li>• The starting substances in a reaction are reactants</li> </ul>

	<ul style="list-style-type: none"> <li>Looking at data from different materials to decide if they are metals or non-metals</li> <li>Use pattern in data to classify metals and non-metals</li> <li>Looking at Dalton's Model of the atom and the development of the atom. Discuss what is meant by peer review</li> </ul> <p><b>Prior learning / retrieval:</b></p> <ul style="list-style-type: none"> <li>Compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>Understand that some materials change state when they are heated or cooled</li> <li>Understand what happens during the process of evaporation and condensation</li> <li>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</li> </ul> <p><b>Links to KS3 NC:</b></p> <ul style="list-style-type: none"> <li>a simple (Dalton) atomic model</li> <li>differences between atoms, elements and compounds</li> <li>chemical symbols and formulae for elements and compounds</li> </ul> <p><b>Disciplinary literacy:</b> Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser. Key Scientific Terms: Element, atom, compound, periodic table, molecules, chemical formulae, chemical properties, physical properties, metalloids, Mendeleev, groups, periods</p> <p><b>Summative assessment:</b> Short Answer recall question assessment End of term assessment</p>	<ul style="list-style-type: none"> <li>Be able to describe the method to carry out distillation</li> <li><b>Be able to carry out chromatography</b></li> <li><b>Analyse chromatograms to identify substances in mixtures</b></li> <li><b>Calculate R<sub>f</sub> values</b></li> </ul> <p><b>Prior learning / retrieval:</b></p> <ul style="list-style-type: none"> <li>Techniques such as filtering, sieving and evaporating can be used to separate mixtures</li> <li>Pupils should be able to recall theory on evaporation and condensation which is covered in Year 7 Chemistry topic 'Particles and their behaviour'</li> <li>know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> </ul> <p><b>Links to KS3 NC:</b> Pure and impure substances</p> <ul style="list-style-type: none"> <li>The concept of a pure substance</li> <li>Mixtures, including dissolving</li> <li>Simple techniques for separating mixtures; filtration, evaporation, distillation and chromatography</li> <li>The identification of pure substances</li> <li>conservation of mass changes of state and chemical reactions</li> </ul> <p><b>Disciplinary literacy:</b> Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser.</p> <p><b>Summative assessment:</b> Short Answer recall question assessment End of term assessment</p>	<ul style="list-style-type: none"> <li>The substances made in a reaction are the products</li> <li>Word equations represent reactions</li> <li><b>Symbols and balancing of symbol equations</b></li> </ul> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>Observe the reactions of group 1 and 7</li> <li>Collect data from observations of the reactions and make conclusions about the patterns in the data</li> <li>Predict the products of the reactions for group 1 and 7</li> <li>Review Mendeleev and the periodic table</li> </ul> <p><b>Prior learning / retrieval:</b></p> <ul style="list-style-type: none"> <li>Compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>Understand that some materials change state when they are heated or cooled</li> <li>Understand what happens during the process of evaporation and condensation</li> <li>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</li> <li>Review of the periodic table, atoms, elements molecules and compounds</li> <li>Review Mendeleev and the periodic table</li> <li>Going across periods and down groups there are patterns in the elements properties</li> <li>Basic group 1 and group 7</li> </ul> <p><b>Links to KS3 NC:</b></p> <ul style="list-style-type: none"> <li>the varying physical and chemical properties of different elements</li> <li>the principles underpinning the Mendeleev periodic table</li> <li>the periodic table: periods and groups; metals and non-metals</li> <li>how patterns in reactions can be predicted with reference to the periodic table</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> </ul> <p><b>Disciplinary literacy:</b> Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser. Key Scientific Terms: Element, atom, compound, periodic table, molecules, chemical formulae, chemical properties, physical properties, metalloids, Mendeleev, groups, periods, Group 1, Group 7, Products, Reactants.</p> <p><b>Summative assessment:</b> Short Answer recall question assessment End of term assessment</p>
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<p>Reactions</p>	<p><b><u>SOL Title: Chemical Reactions 1</u></b></p> <p><i>Wider world and careers: Careers in forensic science, chemical engineer, environmental chemist, lab technicians, environmental chemist</i></p> <p><b>Substantive Knowledge:</b></p> <ul style="list-style-type: none"> <li><b>Chemical formula show the relative number of atoms of each element in a compound</b></li> <li>A chemical reaction is a change in which atoms are rearranged to create new substances.</li> <li>When a chemical reaction occurs you might see flames, notice a smell, feel a temperature change, hear a noise e.g. fizzing/bang</li> <li>Chemical reactions transfer energy e.g. burning petrol</li> <li>Chemical reactions are very useful e.g. making medicine, making fabrics, making building materials.</li> <li>Physical properties describe things you can observe and measure</li> <li>Chemical properties describe how substances take part in chemical reactions</li> <li>Changes of state are known as a physical reaction <ul style="list-style-type: none"> <li>The starting substances in a reaction are reactants</li> <li>The substances made in a reaction are the products</li> </ul> </li> <li>Word equations represent reactions in a simple way <ul style="list-style-type: none"> <li>The pH scale shows how acidic or alkaline a solution is</li> <li>Acids have pH values below 7. The lower the pH, the more acidic the solution</li> <li>Alkaline solutions have pH values above 7. The higher the pH, the more alkaline the solution</li> <li>Neutral solutions are neither acidic nor alkaline. Their pH is exactly 7.</li> <li>Indicators change colour to show whether a solution is acidic or alkaline</li> <li>Universal indicator changes colour to show the pH of a solution</li> <li>Litmus is an indicator. Blue litmus paper turns red on adding acid. Red litmus paper turns blue on adding an alkaline solution</li> <li>In a neutralisation reaction, an acid cancels out a base, or a base cancels out an acid</li> <li>A base is a substance that neutralises an acid</li> <li><b>An alkali is a soluble base</b></li> <li><b>Adding bases or acids to soil can change its pH, making it suitable for different crops.</b></li> <li><b>Adding a base to an acidic lake increases the lake pH making it suitable for different plants and animals</b></li> <li>If an acid reacts with a base, there are two products – a salt and water</li> <li><b>Sulfuric acid makes sulfate salts, hydrochloric acid makes chloride salts and nitric acid makes nitrate salts</b></li> <li><b>Metal oxides are basic. Those that dissolve in water form alkaline solutions. Non-metal oxides are acidic</b></li> </ul> </li></ul>	<p><b><u>SOL Title: Chemical Reactions 2</u></b></p> <p><i>Wider world and careers: Careers in forensic science, chemical engineer, environmental chemist, lab technicians, environmental chemist</i></p> <p><b>Substantive Knowledge:</b></p> <ul style="list-style-type: none"> <li>How you know a chemical reaction has taken place</li> <li>In a chemical reaction the total mass of the reactants is equal to the total mass of the products (Conservation of mass)</li> <li>Chemical formula show the relative number of atoms of each element in a compound</li> <li>The reactivity series lists metals in order of how vigorously they react.</li> <li>The most reactive metals are at the top</li> <li>When potassium, sodium and lithium react with dilute acid they explode. <b>The products are metal salts and hydrogen</b></li> <li>When potassium, sodium, lithium and calcium react with water they react vigorously. <b>The products are a metal hydroxide solution and hydrogen</b></li> <li>When potassium, sodium, lithium, calcium, magnesium, zinc and iron react on heating with air, they burn vigorously. The products are metal oxides</li> <li>Magnesium, Zinc, Iron and Lead react with steam. <b>The products are hydrogen and a metal oxide</b> <ul style="list-style-type: none"> <li>Copper, Silver and gold do not react with dilute acid</li> <li><b>Lead and copper do not burn when heated in air. They form an oxide layer on the surface</b></li> <li>Copper, silver and gold do not react with water</li> <li>Silver and gold do not react on heating in air</li> </ul> </li> <li>If an acid reacts with a metal, there are two products – a salt and hydrogen</li> </ul> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>Observing different types of chemical reaction and identifying if a chemical reaction has occurred</li> <li>Collecting data from observations</li> <li>Investigating the products from Neutralisation reactions</li> <li><b>Predicting the names of the different salts</b></li> <li>Carrying out Scientific methods and using scientific equipment.</li> <li>Skilfully using equipment to measure volumes of chemicals and understanding how to use the chemicals safely</li> </ul> <p><b>Prior learning / retrieval:</b></p> <ul style="list-style-type: none"> <li>Structure of an atom</li> <li>Dalton's Model of atom</li> <li>An element is a substance that cannot be broken down into other substances.</li> <li>The Periodic Table lists the elements. Elements with similar properties are grouped together.</li> </ul>	<p><b><u>SOL Title: Chemical Reactions 3</u></b></p> <p><i>Wider world and careers: Careers in forensic science, chemical engineer, environmental chemist, lab technicians, environmental chemist</i></p> <p><b>Substantive Knowledge:</b></p> <ul style="list-style-type: none"> <li>A fuel is a material which burns to transfer energy by heating</li> <li>Burning is also called combustion and oxidation reactions</li> <li>In an oxidation reaction, substances react with oxygen.</li> <li><b>Decomposition reactions are when a compound breaks down into simpler compounds or elements.</b></li> <li>In a chemical reaction the total mass of the reactants is equal to the total mass of the products (Conservation of mass)</li> <li><b>Combustion</b> <ul style="list-style-type: none"> <li>Catalysts are used to speed up the rate of a reaction and rate of reaction</li> <li>An exothermic reaction is when energy is transferred to the surroundings</li> <li>An endothermic reaction is when the surroundings transfer energy to substances</li> </ul> </li> </ul> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>Observing different types of chemical reaction and identifying if a chemical reaction has occurred</li> <li>Collecting data from observations</li> <li>Carrying out Scientific methods and using scientific equipment.</li> <li>Skilfully using equipment to measure volumes of chemicals and understanding how to use the chemicals safely</li> </ul> <p><b>Prior learning / retrieval:</b></p> <ul style="list-style-type: none"> <li>Structure of an atom</li> <li>Dalton's Model of atom</li> <li>An element is a substance that cannot be broken down into other substances.</li> <li>The Periodic Table lists the elements. Elements with similar properties are grouped together.</li> <li>Every element has its own chemical symbol which scientists all over the world use to identify the element.</li> <li>An atom is the smallest part of an element that can exist</li> <li>There are 92 elements that exist naturally and therefore 92 types of atom.</li> <li>The properties of elements are the properties of very many atoms joined together</li> <li>A compound is a substance made up of atoms which are bonded together</li> <li><b>A compound has different properties to the elements in it as compounds can be made up of different elements</b></li> </ul>



	<ul style="list-style-type: none"> <li>• Writing word equations and basic symbol equations (not balanced)</li> </ul> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Observing different types of chemical reaction and identifying if a chemical reaction has occurred</li> <li>• Collecting data from observations</li> <li>• Investigating the products from Neutralisation reactions</li> <li>• Predicting the names of the different salts</li> <li>• Carrying out Scientific methods and using scientific equipment.</li> <li>• Skilfully using equipment to measure volumes of chemicals and understanding how to use the chemicals safely</li> </ul> <p><b>Prior learning / retrieval:</b></p> <ul style="list-style-type: none"> <li>• Particles and particle model</li> <li>• Structure of an atom</li> <li>• Daltons Model of atom</li> <li>• An element is a substance that cannot be broken down into other substances.</li> <li>• The Periodic Table lists the elements. Elements with similar properties are grouped together.</li> <li>• Every element has its own chemical symbol which scientists all over the world use to identify the element.</li> <li>• An atom is the smallest part of an element that can exist</li> <li>• There are 92 elements that exist naturally and therefore 92 types of atom.</li> <li>• The properties of elements are the properties of very man atoms joined together</li> <li>• A compound is a substance made up of atoms which are bonded together</li> <li>• <b>A compound has different properties to the elements in it as compounds can be made up of different elements</b></li> <li>• Chemical formula show the relative number of atoms of each element in a compound</li> </ul> <p><b>Links to KS3 NC:</b></p> <ul style="list-style-type: none"> <li>• representing chemical reactions using formulae and using equations</li> <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 alkalis to produce a salt plus water</li> </ul> <p><b>Disciplinary literacy:</b> Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser. Key Scientific Terms: Chemical reaction, Reversible, physical Change, Reactants, products, word Equations, acids, alkalis, corrosive, concentrated and dilute, indicator, pH scale, litmus, universal indicator, neutral, Neutralisation, base, Salt,</p> <p><b>Summative assessment:</b> Short Answer recall question assessment End of term assessment</p>	<ul style="list-style-type: none"> <li>• Every element has its own chemical symbol which scientists all over the world use to identify the element.</li> <li>• An atom is the smallest part of an element that can exist</li> <li>• There are 92 elements that exist naturally and therefore 92 types of atom.</li> <li>• The properties of elements are the properties of very man atoms joined together</li> <li>• A compound is a substance made up of atoms which are bonded together</li> <li>• <b>A compound has different properties to the elements in it as compounds can be made up of different elements</b></li> <li>• Chemical formula show the relative number of atoms of each element in a compound</li> <li>• Reactions with acids and alkalis</li> </ul> <p><b>Links to KS3 NC:</b></p> <ul style="list-style-type: none"> <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> <li>• chemical reactions as the rearrangement of atoms</li> <li>• representing chemical reactions using formulae and using equations</li> </ul> <p><b>Disciplinary literacy:</b> Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser. Key Scientific Terms: Acids, metals, state symbols, symbol equation, reactivity series, oxygen,</p> <p><b>Summative assessment:</b> Short Answer recall question assessment End of term assessment</p>	<ul style="list-style-type: none"> <li>• Chemical formula show the relative number of atoms of each element in a compound</li> <li>• Reactions with acids and alkalis</li> <li>• Acids and metals, metals and water, metals and oxygen and the reactivity series of metals</li> </ul> <p><b>Links to KS3 NC:</b></p> <ul style="list-style-type: none"> <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> <li>• chemical reactions as the rearrangement of atoms</li> <li>• representing chemical reactions using formulae and using equations</li> <li>• what catalysts do</li> <li>• exothermic and endothermic chemical reactions (qualitative)</li> </ul> <p><b>Disciplinary literacy:</b> Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser. Key Scientific Terms: Acids, metals, state symbols, symbol equation, reactivity series, oxygen, Displacement reactions, endothermic, exothermic reactions, thermal decomposition, catalysts and rate of reaction, metal extraction, combustion</p> <p><b>Summative assessment:</b> Short Answer recall question assessment End of term assessment</p>
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# Earth

## SOL Title: Rocks

*Wider world and careers: Geologist, Earth Scientist, Careers in the petroleum industry, biotechnology and biochemical processes, forensic Science and the pharmaceutical industry and chemical industry. So many products rely on these techniques and processes. Also, important careers in forensic science and solving crimes. These techniques are used to find evidence to solve them*

### Substantive Knowledge:

- Review importance of atoms elements and compounds
- Understand the structure of the Earth and that compounds formed within the crust as the crust cooled and reacted with the atmosphere to produce our metals and metal ores
- Discuss what the Earth's crust is made up of and give some percentages of those within the crust
- Explain where our everyday materials come from in terms of the Earth
- Describe what today's atmosphere is made up of
  - Discuss what is meant by the atmosphere
  - Describe the formation of sedimentary rocks
- Describe and explain the different processes that weather rock
  - Rock types igneous, sedimentary and metamorphic
  - Understand the properties of different rock types
- Finite resources
  - Oil formation
- Structure of the earth
- Links to plate tectonics, volcanoes and Earthquakes
  - **Make links between crystal sizes in rocks and their formation in igneous rocks**
- Describe the process of heat and pressure in the formation of metamorphic rocks
  - Give some examples of each rock type
  - **Describe and explain the processes that occur in the rock cycle**

### Disciplinary Knowledge:

- Use graphs and data to analysis the composition of the Earth's crust and atmosphere.
- Use and evaluate models to describe the structure of the Earth, e.g. Scotch egg, hardboiled egg, apple.
- Be able to identify the different rocks types from identification keys and relate them to rock samples
- Investigate the crystallisation process in igneous rocks due to cooling rate
- Investigate how fossils are made
- Use data to identify the different compositions of early and present atmosphere
- Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment.

Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and

- exploring how and why they might have changed over time
- using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them.
- Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could explore different soils and identify similarities and differences between them

## SOL Title: Human impact on Earth and new technologies

*Wider world and careers: Geologist, Earth Scientist, Careers in the petroleum industry, biotechnology and biochemical processes, forensic Science and the pharmaceutical industry and chemical industry. So many products rely on these techniques and processes. Also, important careers in forensic science and solving crimes. These techniques are used to find evidence to solve them*

### Substantive Knowledge:

- Earth's atmosphere,
  - carbon cycle, understanding the processes that take place within the cycle
  - global warming and climate change and the causes and impacts
- Understand the difference between global warming and the Greenhouse effect**
- Understand why we need to recycle materials, links to metal extraction
- Advantages and disadvantages of recycling materials
  - Explain how some metals are recycled
  - Discuss the pro and cons of using cars
  - Discuss what is meant by a hydrocarbon
- Explain what is meant by particulates and air pollution
  - Explain the use of new fuels linked to air pollution and global warming
- Advantages and disadvantages of using biofuels
  - Explain what is meant by a fuel cell
  - **Explain how a catalytic converter works and why they are used (links to catalysts)**
- Explain how hybrid cars work and the advantages and disadvantages of their use
  - Explain what a ceramic is and what raw materials from the Earth make ceramics
  - Ceramic materials include pottery and brick. They are hard and brittle with high melting points
  - Explain the uses of ceramics and make links to hydrocarbons
  - Discuss the difference between natural and synthetic polymers
- explain what is meant by a polymer and what they are used for. Make links to the Earth and the explain where the raw materials of synthetic polymer come from (Crude oil)
- polymers from crude oil- are plastics fantastic?- links to fractional

### Disciplinary Knowledge:

- Use data to identify the properties of ceramics, composites and polymers
- Describe a method to make a polymer
- Interpret data to make conclusions about climate change

### Prior learning / retrieval:

- Review importance of atoms elements and compounds
- Understand the structure of the Earth and that compounds formed within the crust as the crust cooled and reacted with the atmosphere to produce our metals and metal ores
- Most metals have high melting points. They are good conductors of heat and electricity. They are shiny and have high densities. They are malleable, ductile and sonorous
- Most non-metals have low melting points. They are poor conductors of heat and electricity. In the solid state they are dull and brittle
- Finite resources

		<ul style="list-style-type: none"> <li>investigate what happens when rocks are rubbed together or what changes occur when they are in water.</li> <li>They can raise and answer questions about the way soils are formed.</li> <li></li> </ul> <p><b>Prior learning / retrieval:</b></p> <ul style="list-style-type: none"> <li>Compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>Understand that some materials change state when they are heated or cooled</li> <li>Understand what happens during the process of evaporation and condensation</li> <li>An element is a substance that cannot be broken down into other substances</li> <li><b>A compound has different properties to the elements in it as compounds can be made up of different elements</b></li> <li>A chemical reaction is a change in which atoms are rearranged to create new substances.</li> <li>There are three states of matter and ideas about particles can be used to explain the properties of a substance in its three states</li> <li>When exposed to different temperatures substances will change state. This can be described as melting, boiling or freezing.</li> <li>Different substances will melt or boil at different temperatures – melting point.</li> <li><b>Melting points can be used to identify substances and check the purity.</b></li> <li><b>Boiling points can be used to identify substances and predict the state of different substances.</b></li> <li>Due to changes of temperature substances can evaporate or condense.</li> </ul> <p><b>Links to KS3 NC:</b></p> <ul style="list-style-type: none"> <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>the composition of the atmosphere</li> </ul> <p><b>Disciplinary literacy:</b> Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser. Key Scientific Terms: Crust, mantle, core, outer core, inner core, resources, atmosphere, troposphere, sedimentary, igneous and metamorphic, porous, weathering, sediments, physical weathering, freeze thaw, chemical weathering, biological weathering, deposition, compaction, cementation, magma, lava, durable, rock cycle, uplift, plate tectonics,</p> <p><b>Summative assessment:</b> Short Answer recall question assessment End of term assessment</p>	<ul style="list-style-type: none"> <li>Oil formation</li> <li>Structure of the earth</li> <li><b>Melting points can be used to identify substances and check the purity.</b></li> <li><b>Boiling points can be used to identify substances and predict the state of different substances.</b></li> <li>Due to changes of temperature substances can evaporate or condense.</li> </ul> <p><b>Links to KS3 NC:</b></p> <ul style="list-style-type: none"> <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 composition of the atmosphere</li> <li>the production of carbon dioxide by human activity and the impact on climate</li> </ul> <p><b>Disciplinary literacy:</b> Students will have the opportunity to read scientific texts from textbooks and non-fiction books. Students will also answer and practice writing extended writing answers using scientific language. Key scientific terms for each lesson will be highlighted on objective sheets and knowledge organiser. Key Scientific Terms:</p>
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