

Step	Strand 1 Atoms, elements and compounds/the particulate nature of matter (Equal weighting)	Strand 2 Pure and impure substances and materials (Equal weighting)	Strand 3 Chemical reactions and energetics (Equal weighting)	Strand 4 The periodic table and patterns of reactivity (Equal weighting)	Strand 5 Earth and atmosphere (Equal weighting)	Strand 6 Working scientifically (Equal weighting)	FOKS4 ESTIMATE
9	All of the below and... <ul style="list-style-type: none"> can explain quantities like Ar, Mr and moles of substance. knows terms such as relative atomic mass and the C-12 scale. knows what an ion is and can work out the electronic configuration of simple anions and cations. 	All of the below and... <ul style="list-style-type: none"> can suggest how the rate of diffusion may be affected. can suggest some applications for making substances impure. can describe the properties of some 'smart materials' and suggest uses for such materials based on their properties. 	All of the below and... <ul style="list-style-type: none"> can suggest methods that may be used to extract metals more reactive than carbon. can explain that during chemical reactions, energy may be absorbed or released during the making and breaking of bonds. 	All of the below and... <ul style="list-style-type: none"> can explain the patterns of reactivity for Group 1 and Group 7 in the periodic table, in terms of atomic structure and the ease of electron transfer. 	All of the below and... <ul style="list-style-type: none"> can explain the carbon cycle and how life and the oceans have altered the Earth's atmosphere from its original composition. can suggest ways that the level of carbon dioxide in the atmosphere can be reduced. 	All of the below and... <ul style="list-style-type: none"> can explain and use the terms accuracy, precision, repeatability, reproducibility, range, interval and bias correctly and in any context. can use data to support or refute an argument or stated position. 	9
8	All of the below and... <ul style="list-style-type: none"> can explain how pressure in gases may change with changing volume and temperature. can draw accurate diagrams of electron structure of atoms and of particular elements using the periodic table. can explain the law of conservation of mass in chemical reactions and changes of state. 	All of the below and... <ul style="list-style-type: none"> can explain how simple techniques for separating mixtures work. can describe dissolving, with reference to particles. can identify pure and impure substances from data. can explain how diffusion happens in terms of the particle model. 	All of the below and... <ul style="list-style-type: none"> can recognise and explain neutralisation, combustion, thermal decomposition, oxidation, displacement and the reaction of metals and acids, as examples of chemical reactions. can explain the differences in properties of different materials, such as metals, diamond, graphite and sodium chloride with reference to their structure. 	All of the below and... <ul style="list-style-type: none"> can explain how metals and non-metals react with water using word-equations. can explain some of the properties of metals and non-metals with reference to their structure. can describe how metal oxides react with water to form an alkaline solution and non-metal oxides react with water to form acidic solutions. can describe the patterns of reactivity for Group 1 and Group 7 in the periodic table. 	All of the below and... <ul style="list-style-type: none"> can explain the production of carbon dioxide by human activity and its impact on the climate. can name some of the molecules that contain carbon on the Earth and in its atmosphere. 	All of the below and... <ul style="list-style-type: none"> can present reasoned explanations, including explaining data in relation to predictions and hypotheses. 	8
7	All of the below and... <ul style="list-style-type: none"> can describe how pressure occurs in gases. knows the composition of atoms of particular elements in terms of the number of protons, neutrons and electrons using the periodic table. 	All of the below and... <ul style="list-style-type: none"> can explain how mixtures are different from elements and compounds. can describe how to carry out simple techniques for separating mixtures. can describe diffusion in terms of the particle model. 	All of the below and... <ul style="list-style-type: none"> can represent chemical reactions using balanced symbol equations. can explain changes of state with reference to the energy levels of particles. can describe neutralisation, combustion, thermal decomposition, oxidation, displacement and the reaction of metals and acids as examples of chemical reactions. can describe how using catalysts, increasing temperature, increasing concentrations or increasing surface area will affect reaction rate, with reference to particles and collisions. 	All of the below and... <ul style="list-style-type: none"> can describe the work of Mendeleev and others in the development of the modern periodic table. can state that metal and non-metal oxides react differently with water. 	All of the below and... <ul style="list-style-type: none"> can explain how the three different types of rocks are formed, and describe, explain and compare the appearance of different rock types including crystal size and grain shapes. can describe how the atmosphere has altered over geological time. can discuss the importance of recycling. 	All of the below and... <ul style="list-style-type: none"> understands and uses IUPAC chemical nomenclature. can identify further questions arising from the results of an investigation. can apply sampling techniques. 	7

6	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can explain changes of states with reference to energy levels of particles. ■ can identify the relative masses and charges of subatomic particles. ■ can label the subatomic particles of a simple atomic model. ■ can recognise and understand more complicated polyatomic chemical formulae including H_2SO_4, CuSO_4, CaCO_3, $\text{Ca}(\text{OH})_2$. 	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can describe a mixture, including dissolved substances. ■ can select appropriate simple techniques for separating given mixtures like solutions and insoluble solids from liquids. ■ can describe how impurities may affect boiling and melting points of impure substances. ■ can describe some properties of different materials such as ceramics, polymers and composites. ■ can suggest uses for different materials based on their properties. 	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can represent chemical reactions using symbol equations which do not need balancing. ■ can describe simple displacement reactions from the order of metals and carbon in the reactivity series. ■ can state that during chemical reactions, energy may be absorbed or released resulting in characteristic temperature changes. ■ can describe changes of states with reference to energy changes. ■ can describe ways to speed up chemical reactions, such as increase temperature, increase concentrations or increase surface area and catalysts. 	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can state that elements in the same group of the periodic table will have similar patterns in reactions. ■ can name some groups of the periodic table including alkali metals, halogens and noble gases. ■ can describe how the properties of metals and non-metals make them suitable for different uses. ■ can identify transition elements from their position in the periodic table. 	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can suggest ways that the level of carbon dioxide in the atmosphere can be reduced. ■ can describe the formation of rocks and explain the rock cycle. ■ can suggest ways that reduce the amount of raw materials we use. ■ can explain the impact of human activities on the climate by producing carbon dioxide. 	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can evaluate data showing awareness of potential sources of random and systematic error. ■ can undertake basic data analysis including simple statistical techniques. ■ can recognise anomalous results in data. ■ can calculate mean data while recognising the need to exclude anomalous results from mean calculations. 	6
5	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can describe the differences between atoms, elements and compounds. ■ can describe atoms using Dalton's simple model. ■ can recognise a simple nuclear atomic model. ■ knows that mass is conserved during changes of state and chemical reactions. ■ can recognise and understand simple chemical formulae including H_2O, CH_4, NH_3 and CO_2. 	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can describe what a pure substance is. ■ can recognise the differences between a mixture and pure substances. ■ can identify and use simple techniques for separating mixtures such as filtration, evaporation, distillation and chromatography. ■ can state that different materials have different properties. 	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can state that during changes of state, there are energy changes. ■ can describe that during chemical reactions, surroundings may increase or decrease in temperature. ■ can state neutralisation, combustion, thermal decomposition, oxidation, displacement and the reaction of metals and acids, as examples of chemical reactions. ■ can represent chemical reactions using word-equations. ■ knows the typical acidic reactions with metals, alkalis and carbonates to form salts. 	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can state that the modern periodic table was developed by Mendeleev with contributions by others. ■ can state that the periodic table can be used to predict patterns in reactions. ■ can identify where metals and non-metals can be found on the periodic table. ■ can state that the periodic table is arranged in periods and groups. ■ can describe how elements with similar physical and chemical properties are grouped together. ■ can list the properties of metals and non-metals. 	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can describe how the three different types of rocks are formed. ■ can name the main elements that make up the Earth's core and crust. ■ can describe the carbon cycle in simple terms. 	<p>All of the below and...</p> <ul style="list-style-type: none"> ■ can make and record observations and measurements using a range of methods for different investigations. ■ can comment on the reliability of methods. ■ can suggest possible improvements to an investigative technique. ■ can work out appropriate axes and scales for graphs. ■ can draw best-fit lines for appropriate data. ■ knows that scientific theories develop as earlier explanations are modified to take into account new evidence. ■ understands the importance of publishing results and peer review. 	5

Step	Strand 1 Atoms, elements and compounds/the particulate nature of matter (Equal weighting)	Strand 2 Pure and impure substances and materials (Equal weighting)	Strand 3 Chemical reactions and energetics (Equal weighting)	Strand 4 The periodic table and patterns of reactivity (Equal weighting)	Strand 5 Earth and atmosphere (Equal weighting)	Strand 6 Working scientifically (Equal weighting)	EOKS4 ESTIMATE
4	All of the below and... <ul style="list-style-type: none"> can represent the three states of matter with diagrams of the arrangement particles. knows the differences between atoms, elements and compounds. can describe how particles may move through a fluid by diffusion. can describe the arrangement and motion of particles in the three states of matter. 	All of the below and... <ul style="list-style-type: none"> knows that mixtures may be separated by filtering, sieving and evaporating. 	All of the below and... <ul style="list-style-type: none"> knows that an indicator may be used to determine if a substance is acidic or alkaline. can apply the pH scale to test substances. knows that different acids and alkalis may have different strengths. knows that some substances are more reactive than others. knows that during chemical reactions reactants become products by rearranging the particles taking part in a reaction. knows that reactants have different properties to the products they make in a reaction. 	All of the below and... <ul style="list-style-type: none"> can define an element as a substance that cannot be split into simpler substances. can state that all elements currently known may be found listed in the periodic table. can understand that elements have their own chemical symbol. can represent elements using chemical symbols. can recall the chemical symbols of commonly found elements including Na, Cl, H, O, Fe, Cu, N. 	All of the below and... <ul style="list-style-type: none"> can describe ways that human activities impact on the climate by producing carbon dioxide. can name the three different types of rocks, igneous, sedimentary and metamorphic. can describe some of the problems that might arise from using the Earth's limited/finite resources. can name the main elements and compounds that make up the Earth's atmosphere and describe its composition in terms of percentages. can state that carbon is present in different forms on the Earth and its atmosphere. can list human activities that have an effect on the climate such as burning fossil fuels. 	All of the below and... <ul style="list-style-type: none"> can use simple equations to carry out calculations from results and interpret observations to identify simple patterns. can ask questions based on observations and make simple predictions. can plan a simple investigation and identify independent, dependent and control variables. can recognise some potential sources of error. 	4
3	All of the below and... <ul style="list-style-type: none"> can name the three states of matter. can describe the properties of the three states of matter. can name the changes of states. 	All of the below and... <ul style="list-style-type: none"> can compare and group together everyday materials. knows that some materials dissolve to form solutions. know and can use key words such as soluble, insoluble, solute, solvent, dissolve and solution. 	All of the below and... <ul style="list-style-type: none"> knows that dissolving, mixing and changes of state are reversible changes. knows some changes are irreversible like burning and the action of vinegar on bicarbonate of soda. 	All of the below and... <ul style="list-style-type: none"> understands that materials may be grouped according to their properties such as hardness, solubility, transparency, conductivity and response to magnets. 	All of the below and... <ul style="list-style-type: none"> can name some resources that humans use from the Earth. can state that the Earth's resources are finite. can identify the Earth's crust, mantle, outer core and inner core. 	All of the below and... <ul style="list-style-type: none"> can name and use some SI units. can name some common chemicals such as water, hydrochloric acid, sodium chloride. can identify hazards and carry out a simple risk assessment. can identify simple patterns or trends from data presented in graphs. 	3
2	All of the below and... <ul style="list-style-type: none"> can compare and group materials according to whether they are solid, liquid or gases. 	All of the below and... <ul style="list-style-type: none"> can observe that some materials change state when they are heated or cooled. 	All of the below and... <ul style="list-style-type: none"> can find out how the shapes of solid objects made from some materials can be changed by squashing, twisting, bending and stretching. 	All of the below and... <ul style="list-style-type: none"> can identify and name everyday materials including wood, plastic, glass, metal, water and rock. 	All of the below and... <ul style="list-style-type: none"> knows that there are different types of rocks. can state that humans use the Earth as a source of resources. 	All of the below and... <ul style="list-style-type: none"> can present findings and draw simple conclusions from experimental data. can present observations and data using simple tables and graphs where axes and scales are provided. 	2
1	Can... <ul style="list-style-type: none"> know that different materials have different properties. 	Can... <ul style="list-style-type: none"> recognise the difference between a pure substance and a mixture. 	Can... <ul style="list-style-type: none"> describe the simple physical properties of a variety of everyday materials. 	Can... <ul style="list-style-type: none"> distinguish between an object and the material from which it is made. 	Can... <ul style="list-style-type: none"> understand that the Earth is one of the planets in the Solar System. know how day and night length changes with the seasons. 	Can... <ul style="list-style-type: none"> take measurements using a range of scientific equipment, including repeat readings. draw simple, correctly-labelled scientific diagrams. follow instructions safely. 	1