Lesson	KS3	Year 7	Year 8	Year 9
5.1.1 The particle model	I can compare and group materials together, according to whether they are solids, liquids or gases I can observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) I can identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	I can state that materials are made up of particles. ☐	I can explain, in terms of particles, why difference substances have different properties. ☐	I can evaluate particle models that explain the properties of substances. ☐
		I can state that the properties of substances can be described in terms of particles in motion. ☐	I can explain properties, such as density, based on the arrangement and mass of particles. ☐	I can use data about particles to predict and explain differences in properties such as density. ☐
		I can state what toy building blocks are representing when they are used to model substances. ☐	I can use models to investigate the relationship between the properties of a material and the arrangement of its particles. ☐	I can design and explain a new model for representing the particle model. ☐
5.1.2 States of matter		I can describe the properties of a substance in its three states. ☐	I can compare the properties of a substance in its three states. ☐	I can argue for how best to classify substances that behave unusually as solids, liquids, or gases. ☐
		I can state that the properties of substances can be described in terms of the arrangement and movement of its particles. ☐	I can explain the properties of solids, liquids, and gases based on the arrangement and movement of their particles. ☐	I can justify whether a given property of a substance in a given state can be explained by the arrangement, or by the movement, of its particles. ☐
		I can make the relevant observations needed to decide if a substance is in its solid, liquid, or gas state. ☐	I can use observations to decide if a substance is in its solid, liquid, or gas state. ☐	I can evaluate a representation of the particle model. ☐
5.1.3 Melting and freezing		I can describe how the properties of a substance change as it melts. ☐	I can use words, and annotated before and after diagrams of particles, to explain ☐	I can explain, in detail, the difference between melting and freezing. ☐

			observations about melting and freezing.	
		I can recognise an energy transfer during a change of state. ☐	I can explain melting and freezing in terms of changes to the energy of particles. ☐	I can suggest reasons for the different melting points of different substances based on the arrangement, movement, and energy of their particles. ☐
		I can describe the changes in state of matter as stearic acid cools. ☐	I can use cooling data to identify the melting point of stearic acid. ☐	I can explain why there is a period of constant temperature during melting and freezing based on the arrangement and movement of particles, and energy transfers. ☐
5.1.4 Boiling		I can describe how the properties of a substance change as it boils. ☐	I can use words, and annotated before and after diagrams of particles, to explain observations about boiling. ☐	I can explain why there is a period of constant temperature during boiling based on the arrangements and movement of particles, and energy transfers. ☐
		I can recognise an energy transfer during a change of state. ☐	I can explain why different substances boil at different temperatures in terms of changes to the energy of particles. ☐	I can suggest reasons for the different melting points of different substances based on the arrangement, movement, and energy of their particles. ☐
		I can draw straightforward conclusions from boiling point data presented in tables and graphs. ☐	I can select data and information about boiling points and use them to contribute to conclusions. ☐	I can assess the strength of evidence from boiling point data, deciding whether it is sufficient to support a conclusion. ☐

5.1.5 More changes of state		I can state the names of changes of state involving gases. ☐	I can draw annotated before and after diagrams of particles, and use words, to explain observations about evaporation, condensing, and subliming. ☐	I can make predictions about what will happen during an unfamiliar physical process – deposition – in terms of particles and their energy. ☐
		I can describe one difference between evaporation and boiling. ☐	I can explain the differences between evaporation, sublimation, and boiling based on the arrangement and movement of particles. ☐	I can compare evaporation, boiling, and sublimation based on the arrangement, movement, and energy transfers of particles. ☐
		I can write a fair test enquiry question about evaporation, and plan the method and how to control the variables. ☐	I can explain why it is important to control variables to provide evidence for a conclusion in an evaporation investigation. ☐	I can justify the procedure and evaluate the results in an evaporation investigation. ☐
5.1.6 Diffusion		I can describe examples of diffusion. ☐	I can describe the evidence for diffusion. ☐	I can evaluate observations that provide evidence for the existence of particles. ☐
		I can state that observations about diffusion can be explained in terms of particles in motion. ☐	I can draw annotated before and after diagrams of particles, and use words, to explain diffusion. ☐	I can draw annotated before and after diagrams of particles, and use words, to predict the relative speed of diffusion when the value of a given independent variable is changed. ☐
		I can write a fair test enquiry question on diffusion, identify the independent and ☐	I can explain why it is important to control variables to provide evidence for a ☐	I can justify the procedure and evaluate the results in a diffusion investigation. ☐

		dependent variables, and plan the method and how to control the variables.	conclusion in a diffusion investigation.	
5.1.7 Gas pressure		I can describe examples of gas pressure. ☐	I can draw annotated particle diagrams, and use words, to explain gas pressure. ☐	I can draw annotated before and after particle diagrams, and use words, to explain what happens to gas pressure as conditions are changed. ☐
		I can use words to explain gas pressure simply. ☐	I can explain unfamiliar observations about gas pressure in terms of particles. ☐	I can predict what will happen to gas pressure as conditions are changed in terms of particles and their energy. ☐
		I can collect and interpret simple data to provide evidence for gas pressure. ☐	I can collect, analyse, and draw a conclusion from data providing evidence for gas pressure. ☐	I can evaluate how well a conclusion about gas pressure is justified by the evidence collected. ☐
5.1.8 Inside particles		I can state definitions of atoms, elements, molecules, and compounds. ☐	I can represent atoms, molecules, and elements using models. ☐	I can compare atoms, molecules, and elements using models. ☐
		I can name one element and one compound. ☐	I can use diagrams to represent atoms and molecules of elements and compounds. ☐	I can use diagrams to compare molecules of an element and a compound. ☐

Lesson	KS2	Year 7	Year 8	Year 9
5.2.1 Pure substances and mixtures	I can compare and group together everyday materials on the basis of their properties, including their hardness, solubility,	I can state what a mixture is and give examples of mixtures. ☐	I can use the particle model to explain what a mixture is. ☐	I can use particle models to compare mixtures and pure substances. ☐
		I can state that a mixture can be ☐	I can explain how to use melting ☐	I can comment on the purity of a substance by ☐

	transparency, conductivity (electrical and thermal), and response to magnets I can know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution I can use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating I can ive reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic I can demonstrate that dissolving, mixing and changes of state are reversible changes	separated due to the different melting points of its components.	temperatures to distinguish mixtures from pure substances.	interpreting temperature change data.
		With help, I can choose a simple technique to separate the substances in a mixture. ☐	I can come up with suitable techniques to separate mixtures, based on their properties. ☐	I can justify the suitability of separation techniques in terms of the properties of constituent substances. ☐
5.2.2 Solutions		I can describe solutions when provided with the key words. ☐	I can explain how substances dissolve using the particle model. ☐	I can explain the relationship between solutes, solvents, and solutions. ☐
		I can describe observations when a substance dissolves. ☐	I can draw annotated before and after particle diagrams to represent dissolving. ☐	I can justify whether a given particle diagram represents a solution or a pure substance. ☐
		I can use observations or data to draw a conclusion about whether something is a solution or a pure liquid. ☐	I can use data to draw a conclusion about the mass of solute dissolved in solution. ☐	I can explain the applications of solution chemistry to different contexts. ☐
5.2.3 Solubility		I can use key words to describe dissolving. ☐	I can explain observations about dissolving. ☐	I can suggest a reason for the effect of temperature on solubility for a given solute. ☐
		I can interpret a bar chart of solubility data. ☐	I can use the solubility curve of a solute to describe and explain simply observations about solutions. ☐	I can analyse and interpret solubility curves. ☐
		I can write a fair test enquiry question on solubility, and plan the method and how to control the variables. ☐	I can explain why it is important to control variables in order to provide evidence for a conclusion in a solubility investigation. ☐	I can justify the procedure and evaluate the results of a solubility investigation. ☐

5.2.4 Filtration		I can state that mixtures can be separated due to differences in their physical properties. ☐	I can identify a physical property that must be diferent in order for a given separation technique to work. ☐	I can explain why a stated physical property must be different in order for a given separation technique to work. ☐
		I can state that the method chosen to separate a mixture depends on which physical properties of the individual substances are different. ☐	I can choose the most suitable techniques to separate a mixture of substances. ☐	I can justify a chosen technique for separating a mixture of substances. ☐
		I can describe how to filter a mixture, with support. ☐	I can use annotated before and after particle diagrams, and words, to explain how filtration works. ☐	I can design a model to explain filtration, and identify advantages and disadvantages of the model. ☐
5.2.5 Evaporation and distillation		I can state that mixtures can be separated due to differences in their physical properties. ☐	I can identify a physical property that must be diferent in order to separate a mixture by evaporation or distillation. ☐	I can compare evaporation and distillation. ☐
		I can state that the method chosen to separate a mixture depends on which physical properties of the individual substances are different. ☐	I can use annotated before and after particle diagrams, and words, to explain how evaporation and distillation work. ☐	I can justify whether evaporation or distillation would be suitable for obtaining given substances from solution. ☐
		I can label distillation apparatus and describe what happens in distillation. ☐	I can use the particle model to explain observations made during the distillation of inky water. ☐	I can consider the physical property utlised when interpreting observations from distillation. ☐
5.2.6 Chromatography		I can describe what happens to a mixture when it undergoes chromatography. ☐	I can explain how chromatography separates mixtures. ☐	I can justify the use of chromatography in different scenarios. ☐

		I can describe what a chromatogram looks like. ☐	I can identify one physical property that must be different and one physical property that must be the same in order to separate a mixture by chromatography. ☐	I can consider how chromatography can be used to monitor the progress of reactions. ☐
		I can use evidence from chromatography to identify unknown substances in mixtures, and to identify the pen or plant a sample is from. ☐	I can use evidence from chromatography to explain how to identify unknown substances in mixtures, and to identify the pen or plant a sample is from. ☐	I can suggest some possible issues to consider when using chromatography to identify unknown substances. ☐

Lesson	KS2	Year 7 Know	Year 8 Apply	Year 9 Extend
5.3.1 Elements		I can state what an element is. ☐	I can correctly write down the chemical symbols of 16 elements and, given chemical symbols, write down their names. ☐	I can suggest the advantages of using the same chemical symbols in all languages. ☐
		I can state the chemical symbols of 16 elements. ☐		
5.3.2 Atoms		I can state what an atom is. ☐	I can represent atoms and elements using particle diagrams. ☐	I can estimate the number of atoms in a sample. ☐
		I can state that every element has its own type of atom. ☐	I can compare the properties of an atom of an element to the properties of many atoms. ☐	I can use a model to draw conclusions about how the properties of atoms together contribute to the properties of an element. ☐
5.3.3 Compounds		I can state what a compound is. ☐	I can represent elements, mixtures, ☐	I can use particle diagrams to help to explain why a ☐

			and compounds using particle diagrams.	compound has different properties to the elements whose atoms it contains.
		I can use particle diagrams to classify a substance as an element, mixture, or compound. ☐	I can compare the properties of a compound to the properties of the element whose atoms it contains. ☐	I can compare and contrast the properties of elements and compounds and give a reason for their differences. ☐
5.3.4 Chemical formulae		I can name simple compounds. ☐	I can name compounds using their chemical formulae. ☐	I can deduce a pattern in the formula of similar compounds and use it to suggest formulae for unfamiliar ones. ☐
		I can use particle diagrams to classify a substance as an element or compound. ☐	I can name the elements present and their relative proportions, given chemical formulae. ☐	I can find the element whose atoms contribute the greatest mass to the compound, given relative masses of atoms. ☐
		I can represent simple compounds using models. ☐	I can represent elements, compounds, and mixtures using particle diagrams. ☐	
5.3.5 Polymers		I can state what a polymer is. ☐	I can represent elements, mixtures, and compounds using particle diagrams and physical models. ☐	I can use particle diagrams to predict physical properties of compounds. ☐
		I can state some uses of polymers. ☐	I can explain how polymer properties make them suitable for their uses. ☐	I can compare properties of different polymers. ☐
		I can describe the structure of a polymer.	I can explain how polymer properties depend on their molecules.	

5.4.1 The Periodic Table		I can state that the horizontal rows of the Periodic Table are called periods, and the vertical columns are called groups. ☐	I can use data to describe a trend in physical properties. ☐	I can use data about the properties of elements to identify similarities, patterns, and anomalies. ☐
		I can state that as you go down a group and across a period the elements show patterns in physical properties. ☐	I can use data showing a pattern in physical properties to predict the missing value for an element. ☐	I can explain how to predict missing data values using trends in properties. ☐
5.4.2 The elements of Group 1		I can state that the elements in Group 1 all react in a similar way and show a pattern in reactivity. ☐	I can use data to describe a trend in physical properties of Group 1 elements. ☐	I can use data about the properties of elements to identify similarities, patterns, and anomalies. ☐
		I can state that as you go down Group 1 the elements show patterns in physical properties. ☐	I can use data showing a pattern in physical properties to predict the missing value for an element in Group 1. ☐	I can choose elements for different uses from their position in the Periodic Table. ☐
		I can make and record observations of chemical reactions in a table. ☐	I can use observations of a pattern in chemical reactions to predict the behaviour of an element in Group 1. ☐	
5.4.3 The elements of Group 7		I can state that the elements in Group 7 all react in a similar way and show a pattern in reactivity. ☐	I can use data to describe a trend in physical properties of Group 7 elements. ☐	I can use data about the properties of elements to identify similarities, patterns, and anomalies. ☐
		I can state that as you go down Group 7 the elements show patterns in physical properties. ☐	I can use observations of a pattern in chemical reactions to predict the behaviour of an element in Group 7. ☐	I can predict the position of an element in the Periodic Table based on information about its chemical properties. ☐

		I can identify hazards of working with Group 7 elements. ☐	I can identify control measures when working with Group 7 elements. ☐	
5.4.4 The elements of Group 0		I can state that the elements in Group 0 are unreactive. ☐	I can use data to describe a trend in physical properties in Group 0. ☐	I can use data about the properties of elements to identify similarities, patterns, and anomalies. ☐
		I can state that as you go down Group 0 the elements show patterns in physical properties. ☐	I can use data showing a pattern in physical properties to predict the missing value for an element in Group 0. ☐	I can choose elements for different uses based on their positions in the Periodic Table. ☐
			I can describe the reactions of Group 0 elements. ☐	

Lesson	KS2	Year 7	Year 8	Year 9
6.1.1 Chemical reactions	I can explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	I can describe some features of chemical reactions. ☐	I can explain what a chemical reaction is, giving examples. ☐	I can justify the use of specific metals and non-metals for different applications.
		I can give examples of chemical reactions and physical changes. ☐	I can deduce whether described change is a physical change or a chemical reaction. ☐	I can compare chemical reactions to physical changes. ☐
		I can record simple observations from practical work. ☐	I can record detailed observations from practical work. ☐	I can deduce whether an observed or described change is a physical change or a chemical reaction. ☐
6.1.2 Acids and alkalis		I can name some common properties of acids and alkalis. ☐	I can compare the properties of acids and alkalis. ☐	I can compare the different particles found in acids and alkalis. ☐

		I can describe, in simple terms, what the key words 'concentrated' and 'dilute' mean. ☐	I can describe differences between concentrated and dilute solutions of an acid. ☐	I can explain what 'concentrated' and 'dilute' mean, in terms of the numbers of particles present. ☐
		I can label hazard symbols and describe the hazards relating to them. ☐	I can identify and describe the meaning of hazard symbols and offer suitable safety precautions. ☐	I can offer suitable safety precautions when given a hazard symbol, and give a reason for the suggestion. ☐
6.1.3 Indicators and pH		I can state that acids have a pH below 7, neutral solutions have a pH of 7, and alkalis have a pH above 7. ☐	I can use the pH scale to measure acidity and alkalinity. ☐	I can compare the use of a variety of indicators and a pH probe to measure acidity and alkalinity. ☐
		I can state that indicators will be different colours in acids, alkalis, and neutral solutions. ☐	I can describe how indicators categorise solutions as acidic, alkaline, or neutral. ☐	I can deduce the hazards of different acids and alkalis using data about their pH. ☐
		I can identify the pH of a solution using experimental observations. ☐	I can identify the best indicator to distinguish between solutions of different pH, using data provided. ☐	I can evaluate the accuracy of the pH values chosen through the experimental observations. ☐
6.1.4 Acid strength		I can state examples of strong and weak acids. ☐	I can explain the difference between a strong acid and a weak acid. ☐	I can explain the difference between acid strength and acid concentration. ☐
		I can state the pH range for acidic solutions. ☐	I can compare pH values of concentrated and dilute solutions of the same acid. ☐	I can deduce the hazards of different acids using data about their concentration and pH. ☐
			I can use models to show the difference ☐	I can evaluate models for strong and weak ☐

			between a strong acid and a weak acid.	acids, and suggest improvements.
6.1.5 Neutralisation		I can state simply what happens during a neutralisation reaction. ☐	I can describe a method for making a neutral solution from an acid and an alkali. ☐	I can interpret a graph of pH changes during a neutralisation reaction. ☐
		I can give one example of a neutralisation reaction. ☐	I can explain how neutralisation reactions are used in a range of situations. ☐	I can justify the method chosen to investigate which indigestion remedy is 'better'. ☐
		I can identify independent, dependent, and control variables in an investigation. ☐	I can design an investigation to find out which indigestion remedy is 'better'. ☐	
6.1.6 Making salts		I can state the type of substances made when an acid and alkali react. ☐	I can describe what a salt is. ☐	I can explain what the formation of salt displaces from the acid. ☐
		I can match the type of salt that will form from the type of acid used. ☐	I can choose the correct name of the salt formed in a neutralisation reaction from a list of possible salts. ☐	I can predict the names of salts formed when acids react with metals or bases, and write word equations to represent the reactions. ☐
		I can describe observations during an experiment. ☐	I can describe the steps in making a salt in a neutralisation reaction. ☐	I can describe and explain the steps involved in making a salt in a neutralisation reaction. ☐
				I can estimate the pH value of an acid based on information about its reactions. ☐

Lesson	KS2	Year 7	Year 8	Year 9
		I can state what an element is. ☐	I can identify an unknown element from ☐	I can justify the use of specific metals and non- ☐

6.2.1 More about elements			its physical and chemical properties.	metals for different applications, using data provided.
		I can state examples of elements. ☐	I can compare the properties of typical metals and non-metals. ☐	I can deduce the relationship between the position of an element in the periodic table and its properties. ☐
		I can present some simple facts about an element. ☐	I can record observations and data on elements. ☐	I can use observations and data obtained to form conclusions about given elements. ☐
6.2.2 Chemical reactions of metals and non-metals		I can state that many elements react with oxygen to form oxides. ☐	I can use particle diagrams to represent oxidation reactions. ☐	I can decide whether a word equation represents an oxidation reaction. ☐
		I can state what the arrow means in a word equation. ☐	I can describe an oxidation reaction with a word equation. ☐	I can interpret a word equation to name reactants and products. ☐
		I can describe a difference in physical properties between typical metal and non-metal oxides. ☐	I can classify the products obtained when typical metal and non-metal elements react with oxygen. ☐	I can deduce the physical or chemical changes a metal has undergone from its appearance. ☐
6.2.3 Metals and acids		I can describe what happens when metals react with acids. ☐	I can compare the reactions of different metals with dilute acids. ☐	I can suggest how temperature changes may be linked with differences in reactivity between metals with acid. ☐
		I can state that when a metal reacts with an acid the products are a salt and hydrogen gas. ☐	I can predict the names of the products formed in a metal-acid reaction, and describe the reaction with a word equation or represent it with a particle diagram. ☐	

		I can state which metals produce bubbles when reacting with acid. ☐	I can decide which metals react more vigorously from practical observations. ☐	
6.2.4 Metals and oxygen		I can state the product of reactions between metals and oxygen. ☐	I can compare the reactions of different metals with oxygen. ☐	I can explain the reactivity of metals according to how they react with oxygen. ☐
		I can name one metal that reacts vigorously with oxygen and one metal that does not react with oxygen. ☐	I can describe an oxidation reaction with a word equation. ☐	I can justify the use of specific metals for different applications, using data provided. ☐
		I can make observations about how different metals react with oxygen. ☐	I can rank metals in order of how vigorously they react with oxygen. ☐	I can deduce the physical or chemical changes a metal has undergone from its appearance. ☐
6.2.5 Metals and water		I can state the products of the reaction between metals and water. ☐	I can compare the reactions of different metals with oxygen. ☐	I can link a metal's reactions with its place in the reactivity series. ☐
		I can state whether a metal is more or less reactive than another metal. ☐	I can use the reactivity series to predict reactions, and place an unfamiliar metal into the reactivity series based on information about its reaction. ☐	I can deduce a rule from data about which reactions will occur or not, based on the reactivity series. ☐
		I can write a simple method to find out how easily metals react with acids or water. ☐	I can plan a practical to compare the reactivity of three metals, including identifying control variables and planning how to control them. ☐	I can write a suitable fair test question and plan in detail which variables to control and how to control them. ☐

6.2.6 Metal displacement reactions		I can state which metal is more reactive in a pair of named metals. ☐	I can predict if a given pair of substances will react in displacement reactions. ☐	I can explain predictions about displacement reactions. ☐
		I can state where different metals are found in the reactivity series. ☐	I can use the reactivity series to explain displacement reactions. ☐	I can devise a model to explain displacement reactions. ☐
		I can use observations from experiments to state whether or not a displacement reaction has occurred. ☐	I can use word equations and particle diagrams to represent displacement reactions. ☐	I can suggest the identity of unkown metals, given information about their reactions. ☐

Lesson	KS2	Year 7	Year 8	Year 9
6.3.1 Atoms in chemical reactions		I can state that in a chemical reaction particles are rearranged, but the total number of atoms is conserved. ☐	I can interpret particle diagrams and models to explain what happens in a chemical reaction. ☐	I can explain in detail what happens to the particles in chemical reactions such as those between a metal and oxygen. ☐
		I can write word equations from information about chemical reactions. ☐	I can draw particle diagrams and make models to show what happens in a chemical reaction. ☐	
		I can identify possible hazards in a demonstration. ☐	I can identify risks, hazards, and control measures in a demonstration. ☐	
6.3.2 Combustion		I can state that combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light. ☐	I can explain why a given reaction is an example of combustion. ☐	I can compare the pros and cons of fuels in terms of their products of combustion. ☐

		I can state that chemical changes can be described by a model in which atoms in reactants rearrange to make products. ☐	I can predict the products of combustion of a given reactant and show the reaction as a word equation. ☐	
		I can write word equations from information about chemical reactions. ☐	I can use a particle diagram to show what happens in a reaction. ☐	
		I can design a table suitable for gathering specific data. ☐		
6.3.3 Thermal decomposition		I can state that thermal decomposition is a reaction in which a single reactant is broken down into simpler products by heating. ☐	I can explain why a given reaction is an example of combustion or thermal decomposition. ☐	I can devise a general rule for how a set of compounds thermally decomposes. ☐
		I can state that chemical changes can be described by a model in which atoms in reactants rearrange to make products. ☐	I can predict the products of thermal decomposition of a given reactant and show the reaction as a word equation. ☐	
		I can write word equations from information about chemical reactions. ☐	I can use a particle diagram to show what happens in a reaction. ☐	
			I can make a conclusion and explain it. ☐	
6.3.4 Conservation of mass		I can state that chemical changes can be described by a model in which atoms in reactants ☐	I can explain observations about mass in a chemical or physical change. ☐	I can use known masses of reactants or products to calculate unknown masses of the ☐

		rearrange to make products.		remaining reactant or product.
			I can make a conclusion and explain it. ☐	I can balance a symbol equation. ☐

Lesson	KS2	Year 7	Year 8	Year 9
6.4.1 Exothermic and endothermic		I can state that an exothermic reaction is one in which energy is given out, usually as heat or light. ☐	I can compare the characteristics of exothermic and endothermic reactions. ☐	I can explain exothermic and endothermic reactions in terms of energy transfers to and from the surroundings. ☐
		I can state that an endothermic reaction is one in which energy is taken in, usually as heat. ☐	I can use experimental observations to distinguish exothermic and endothermic reactions. ☐	I can use energy data to select a reaction for a chemical hand warmer or cool pack. ☐
		I can record temperature changes in exothermic and endothermic changes. ☐	I can calculate the temperature change and make a conclusion in a range of exothermic and endothermic changes. ☐	
6.4.2 Energy level diagrams		I can state that an exothermic reaction is one in which energy is given out, usually as heat or light. ☐	I can use a diagram of relative energy levels of particles to explain energy changes observed during changes of state and chemical reactions. ☐	I can suggest why the temperature of the system decreases at first for an endothermic process. ☐
		I can state that an endothermic reaction is one in which energy is taken in, usually as heat. ☐	I can compare the energy transferred during the combustion of 1 kg of different heating fuels. ☐	I can use models and diagrams to explain energy level diagrams clearly and in detail. ☐
		I can identify whether an energy level diagram is showing an exothermic or endothermic change. ☐	I can models and diagrams to explain energy level diagrams. ☐	I can use an energy level diagram to explain whether a given reaction would be more ☐

				suitable for a chemical hand warmer or a cool pack.
6.4.3 Bond energies		I can state that during a chemical reaction bonds are broken (requiring energy) and new bonds formed (releasing energy). If the energy released is greater than the energy required, the reaction is exothermic. If the reverse, the reaction is endothermic. ☐	I can use a diagram of relative energy levels of particles to explain energy changes observed during a change of state. ☐	I can predict whether a chemical reaction will be exothermic or endothermic given data on bonod strengths. ☐
		I can state that catalysts are substances that speed up chemical reactions but are unchanged at the end. ☐	I can use ideas about bond energies to explain energy changes in chemical reactions. ☐	I can explain in detail bond breaking and bond making in terms of energy changes. ☐
		I can use ideas about bond energies to outline an explanation about energy changes in chemical reactions. ☐		

Lesson	KS2	Year 7	Year 8	Year 9
7.1.1 The structure of the Earth	I can compare and group together different kinds of rocks on the basis of their appearance and simple physical properties	I can name the layers of the Earth. ☐	I can describe properties of the different layers of the Earth's structure. ☐	I can compare the different layers of the Earth in terms of their properties. ☐
		I can state what a mineral is. ☐	I can explain that most rocks are mixtures of minerals. ☐	I can interpret data about the elements that make up the Earth's crust. ☐

	I can describe in simple terms how fossils are formed when things that have lived are trapped within rock I can recognise that soils are made from rocks and organic matter.	I can design a simple model of the Earth using information about its structure. ☐	I can describe advantages and disadvantages of a given model of the Earth's structure. ☐	I can explain why models are good or poor representations of the Earth's structure in terms of the materials used.
7.1.2 Sedimentary rocks		I can state a property of sedimentary rocks. ☐	I can explain why a sedimentary rock has a particular property based on how it was formed. ☐	I can predict planetary conditions from descriptions of rocks on other planets. ☐
		I can describe how sedimentary rocks are made. ☐	I can identify the causes of weathering and erosion and describe how they occur. ☐	I can explain detail each stage in the formation of a sedimentary rock. ☐
		I can state the processes shown by different models of the stages in sedimentary rock formation. ☐	I can explain how how a given model represents a particular process in the formation of sedimentary rock. ☐	I can evaluate strengths and weaknesses for models of sedimentary rock formation, giving reasons. ☐
7.1.3 Igneous and metamorphic rocks		I can state one difference between igneous and metamorphic rocks. ☐	I can explain in detail how igneous and metamorphic rocks form. ☐	I can discuss examples of rocks that illustrate the different methods of formation of igneous and metamorphic rocks. ☐
		I can describe how igneous and metamorphic rocks are formed. ☐	I can explain why igneous and metamorphic rocks have particular properties based on how they were formed. ☐	I can identify circumstances that indicate fast processes of change on Earth and those that indicate slower processes. ☐
		I can describe what you see when a substance representing lava is cooled. ☐	I can predict observations when a substance representing lava is cooled at different temperatures. ☐	I can predict observations when a substance representing lava is cooled, using knowledge about igneous rock formation to explain the answer. ☐

7.1.4 The rock cycle		I can give simple facts about how a rock can be changed from one type to another. ☐	I can use the rock cycle to explain how the material in rocks is recycled. ☐	I can give a detailed description and explanation of the journey of material through the rock cycle. ☐
		I can state what happens to wax in a model rock cycle. ☐	I can describe how changes in the wax used to represent a rock represent the real rock cycle. ☐	I can suggest similarities and differences between the rock cycle and everyday physical and chemical properties. ☐
7.1.5 Ceramics		I can list the properties of ceramics. ☐	I can use data on properties to decide which materials might be ceramics. ☐	I can justify decisions made from property data about which materials might be ceramics. ☐
		I can list some uses of ceramics. ☐	I can explain why properties of ceramics make them suitable for their uses. ☐	I can suggest how ceramic materials might be similar to some types of rock. ☐
		I can suggest a simple method for comparing the strength of ceramic materials given a choice of apparatus. ☐	I can plan a method for comparing the strength of ceramic materials, including devising a fair test question, identifying control variables, and identifying risks, hazards and control measures. ☐	I can plan a method for comparing the strength of ceramic materials, justifying choices of experimental techniques, apparatus and the measures to control risk. ☐

Lesson	KS2	Year 7	Year 8	Year 9
7.2.1 The night sky	I can describe the movement of the Earth, and other planets, relative to the Sun in the solar system	I can name some objects seen in the night sky. ☐	I can describe how space observation of stars is affected by the scale of the Universe. ☐	I can describe the structure of the Universe in detail, in order ☐

	I can describe the movement of the Moon relative to the Earth I can describe the Sun, Earth and Moon as approximately spherical bodies			of size and distance away from the Earth.
		I can state a unit that astronomers use to measure distance. ☐	I can explain the choice of light years as a unit of measuring distances in astronomy. ☐	I can use the speed of light to describe distances between astronomical objects. ☐
		I can identify scientific evidence from secondary evidence. ☐	I can draw valid conclusions that utilise more than one piece of supporting evidence. ☐	I can assess the strength of evidence, deciding whether it is sufficient to support a conclusion.
7.2.2 The Solar System	I can use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	I can name some objects in the Solar System. ☐	I can describe how objects in the Solar System are arranged. ☐	I can explain how the properties and features of planets are linked to their place in the Solar System. ☐
		I can explain how we see planets. ☐	I can explain why we see objects in the Solar System, and describe how they appear to move. ☐	I can explain why we see objects in the Solar System, and why they appear to move as they do. ☐
		I can identify some patterns in the Solar System. ☐	I can describe how space exploration is affected by the scale of the Universe. ☐	I can make deductions from observation data of planets, stars, and galaxies. ☐
7.2.3 The Earth		I can describe differences between seasons. ☐	I can explain the motion of the Sun, stars, and Moon across the sky. ☐	I can predict the effect of the Earth's tilt on temperature and day length. ☐
		I can describe the motion of the Sun, stars, and Moon across the sky. ☐	I can explain why seasonal changes happen. ☐	I can predict how seasons would be different if there was no tilt. ☐
		I can describe patterns in data linking day length during the year. ☐	I can use data to show the effect of the Earth's tilt on temperature and day-length. ☐	I can interpret data to predict how the Earth's tilt affects temperature and day length. ☐

7.2.4 The Moon and changing ideas		I can name some phases of the Moon. ☐	I can describe the phases of the Moon. ☐	I can predict phases of the Moon at a given time. ☐
		I can explain simply why we see the Moon from the Earth. ☐	I can describe the appearance of the Moon from diagrams of the Earth, Sun, and Moon. ☐	I can explain how total eclipses are linked to phases of the Moon. ☐
		I can show the different phases of the Moon using models provided. ☐	I can explain phases of the Moon using the models provided. ☐	I can predct the phases of the Moon using models provided. ☐
		I can name the current model of the Solar System. ☐	I can describe evidence that led to a change in the model of the Solar System. ☐	I can compare explanations about the motion and structure of the Universe from different periods in history. ☐

Lesson	KS2	Year 7 Know	Year 8 Apply	Year 9 Extend
7.3.1 Global warming		I can state that global warming is the gradual increase in surface temperature of the Earth. ☐	I can design a model to explain the greenhouse effect, and use an annotated diagram to describe the model in detail. ☐	I can compare the relative effects of human-produced and natural global warming. ☐
		I can state that the greenhouse effect is when energy from the Sun is transferred to the thermal energy store of gases I the Earth's atmosphere. ☐	I can interpret graphs that show trends over time. ☐	I can design and evaluate a model to explain the greenhouse effect, and use an annotated diagram to describe the model in detail. ☐
		I can state the names and percentages of the gases that make up the Earth's atmosphere and name two greenhouse gases. ☐	I can describe and explain what is meant by global warming. ☐	I can interpret graphs that show trends over time, and explain their limitations. ☐

		I can outline a design for a model to explain the greenhouse effect. ☐		
7.3.2 The carbon cycle		I can state the changes in levels of carbon dioxide over time. ☐	I can explain why the concentration of carbon dioxide in the atmosphere did not change for many years. ☐	I can explain changes in the levels of carbon dioxide using stages of the carbon cycle. ☐
		I can name one carbon sink. ☐	I can use the carbon cycle to identify carbon sinks. ☐	I can use equations to explain processes that exchange carbon dioxide into and out of the atmosphere. ☐
		I can list the processes that recycle carbon naturally. ☐	I can use the carbon cycle to show how carbon is recycled. ☐	
7.3.3 Climate change		I can state that scientists have evidence that global warming caused by human activity is causing changes in climate. ☐	I can describe how human activities affect the carbon cycle. ☐	I can compare the relative effects of human-produced and natural global warming. ☐
		I can give examples of impacts of climate change. ☐	I can describe how global warming can impact on climate and local weather patterns. ☐	I can evaluate the implications of a proposal to reduce carbon emissions. ☐
			I can give arguments for and against the claim that human activity is causing global warming and climate change. ☐	I can evaluate claims that human activity is causing global warming or climate change. ☐

Lesson	KS2	Year 7 Know	Year 8 Apply	Year 9 Extend
7.4.1 Extracting metals		I can state that most metals are found combined with other ☐	I can describe how Earth's resources are ☐	I can suggest ways in which waste products ☐

		elements, as a compound, in ores.	turned into useful materials or recycled.	from industrial processes could be reduced.
		I can name two processes used to extract metals from their compounds. ☐	I can justify the choice of extraction method for a metal, given data about reactivity. ☐	I can suggest how a laboratory practical is like and unlike an industrial process to extract a metal. ☐
		I can identify the features of a reaction that are hazardous. ☐	I can suggest factors to take into account when deciding whether extraction of a metal is practical. ☐	
			I can identify control measures for carrying out a reaction safely. ☐	
7.4.2 Recycling		I can state that there is only a limited quantity of any resource on Earth, so the faster it is extracted, the sooner it will run out. ☐	I can describe how Earth's resources are turned into useful materials or recycled. ☐	I can use data to evaluate proposals for recycling materials. ☐
		I can state that recycling reduces the need to extract resources. ☐	I can explain why recycling of some materials is particularly important. ☐	I can suggest ways in which changes in behaviour and the use of alternative materials may limit the consumption of natural resources. ☐
		I can draw a bar chart to represent data. ☐	I can explain why given data is best presented as a bar chart. ☐	